

THE UNIVERSITY OF MANITOBA

THE PROBLEM OF MIGRATORY WATERFOWL CROP DEPREDATION: WITH SPECIFIC
REFERENCE TO MANITOBA

by

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ABSTRACT

THE PROBLEM OF MIGRATORY WATERFOWL CROP DEPREDATION WITH SPECIFIC REFERENCE TO MANITOBA

By: Lois K. Harrison

Advisor: Dr. Clay Gilson

Migratory waterfowl exhibit the characteristics of what are normally referred to as common property resources. In the absence of regulations the characteristics of free access and non-exclusion can lead to over-exploitation of the resource, and in the case of a wildlife species, to eventual extinction of the resource. Because society values the existence of migratory waterfowl, efforts have been undertaken by both private and government groups to preserve these species. The preservation actions undertaken within agricultural areas have added to the problem already existing, of migratory waterfowl causing damage to agricultural crops. Migratory waterfowl, during the fall staging period at preservation sites, will forage for food within nearby producers swathed grain fields. The financial loss to the agricultural producer, under certain ecological and climatic conditions, can be quite extensive. In order to alleviate the financial loss to the agricultural producer, two programs were implemented, a compensation program and a crop damage prevention program.

The general objectives of this study were to examine the extent of the crop depredation problem within Manitoba, and to analyze the present

Compensation Program's ability to deal with the problem. Inclusive to this is an economic evaluation of the efficiency implications of the level of compensation upon the agronomic practices of agricultural producers and, an evaluation of the jurisdictional and legal implications of crop depredation upon the financial structuring of the program. With the aid of the above information, alternative policy proposals to the present Compensation Program were examined and evaluated in terms of their effects upon the various interest groups involved.

The results of this study are briefly as follows. The first conclusion reached was that compensation can create disincentive effects for agricultural producers to undertake efficient agronomic practices. A trade-off between efficiency and equity is frequently required, with the degree of trade-off based upon the objectives of the policy maker. The second conclusion reached was that there exists no legal responsibility on behalf of either the federal or provincial government to compensate agricultural producers for crop damage caused by migratory waterfowl. In addition, it is difficult to determine the correct cost-sharing arrangement that should exist between the two governments because there is no clear delineation of responsibility for migratory waterfowl and its preservation in the legislation reviewed.

The analysis of alternative policy options to the compensation scheme presently in existence indicated that a 100 percent compensation scheme would mean a 70 percent increase in the magnitude of government contributions. A 100 percent compensation level was considered to promote disincentive effects upon the agricultural producer with regard to damage prevention activities. A percent based coverage level was considered to

be more equitable than a per acre maximum coverage because it does not discriminate against producers of higher valued or higher yielding crops. Increased prevention activities in conjunction with a compensation scheme could theoretically reduce the total expenditure toward crop depredation.

An increment to hunting license fees of \$2.25 would cover the cost of compensation for the full value of grain damaged by migratory waterfowl. However, the cost distribution among migratory waterfowl users would not be evenly distributed under this system of fund raising.

The concept of a spot-loss insurance option for migratory waterfowl crop damage was considered infeasible because of the lack of a random probability of damage occurring for the province. Damage is too concentrated within small areas to be able to spread the risk through an insurance program.

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Chapter I

WATERFOWL CROP DEPREDAATION IN THE PRAIRIE PROVINCES OF CANADA

1.1 INTRODUCTION AND STUDY OBJECTIVES

Crop depredation by migratory waterfowl is presently a problem in the prairie region of Canada. During the spring and fall of the year, large numbers of waterfowl pass through this region enroute to and from their summer nesting grounds. The waterfowl stop along the way to rest and to feed; the primary source of food being fields of swathed grain lying unharvested in the vicinity of the resting areas. The financial losses to the agricultural producer resulting from waterfowl feeding upon this grain can be quite severe under certain ecological and climatic conditions which are specified in a later section. In certain areas where crop depredation is a recurring problem, friction has developed between producers and groups which are involved in the promotion and implementation of preservation activities for migrating waterfowl populations and their habitat.

The situation of migratory waterfowl creating financial losses for agricultural producers through crop depredation is not a recent problem. It was not until recently, however, that temporary measures were introduced to alleviate the financial and social tensions. These measures have taken the form of compensation and prevention programs. The results of the programs have not been satisfactory. Dissatisfaction exists with reference to the level of crop damage for which compensation is received and the effectiveness of the preventive measures undertaken.

Both programs have received considerable criticism from agricultural producers who incur crop damage and government officials who are involved in the formulation and administration of the programs.¹

Throughout the course of this study the underlying assumption is made that agricultural producers are entitled to the receipt of compensation for waterfowl damage. The general premise upon which this conclusion is justified is in terms of the commencement of risk and the role of government preservation policies in increasing the risk. Preservation actions by government and private organizations have had the effect of concentrating fall migrating waterfowl into specific areas of the province. As a result, the waterfowl requirements for food within these areas have increased and producers have received higher crop damage levels than previously. The agricultural producer receiving crop damage bears a substantial proportion of the costs associated with waterfowl preservation while society receives the major portion of the benefits.

The extent that government implemented preservation policies have increased the level of crop damage is debatable, as is the question of government responsibility for crop damage and the subsequent payment of compensation. However, the federal and provincial governments have indirectly conceded both responsibility for the payment of compensation through the initial implementation of a compensation and a prevention program. Through the implementation of the two programs, the government has admitted that there is justification for the producers claim that compensation should be paid for waterfowl inflicted crop damage.

¹ Source: Personal communication with individuals at both government and farm level.

The present study was undertaken with the following three objectives in mind.

Objectives:

1. To investigate and evaluate the problem of migratory waterfowl inflicted crop damage within the Province of Manitoba. Included in this evaluation is a summary of the background information available, an examination of the extent of the problem as it exists at the present time (financial and attitudinal), and an evaluation of the compensatory program presently in effect to remedy the problem. The Prevention Program is considered to operate in conjunction with the Compensation Program and not as a separate solution. The potentially positive effects of the Prevention Program upon the level of waterfowl crop depredation will reduce the amount of expenditure required through the Compensation Program. This study evaluates it on this basis and, therefore, centers its attention more specifically around the more controversial principles and attitudes associated with the Compensation Program.

2. The second objective includes two facets. The first is a review of the economic theory underlying wildlife resources and their preservation, and the carryover effects associated with this preservation. The basic economic criteria of the compensation principle and the ability of the existing program to meet this criteria will be examined.

The second facet is a review of the jurisdictional and legal implications of the migratory waterfowl preservation and protection programs. Much of the controversy surrounding the payment of compensation centers around the question of liability. Therefore, in order to determine the appropriate financial structuring of the Compensation Program, it is

necessary to make an attempt to answer the question of who should bear the cost.

3. The third major objective is to analyze proposed policy alternatives to the Compensation Program. These alternatives range from a restructuring of the present Compensation Program to the derivation of a spot-loss insurance program. The effects of these alternatives upon the various interest groups (specified in a later section), constitute a major portion of the analysis.

1.2 BACKGROUND TO THE CROP DEPREDATION PROBLEM

Damage inflicted on agricultural crops by migratory waterfowl first became a problem to producers within the prairie region of Canada in the mid 1940's with the introduction of two technological innovations. The first innovation was the change in the method of harvest from threshing machines to combines. This resulted in the replacement of stooks by swaths which are more readily accessible to migratory waterfowl. The second innovation was the development of new strains of higher yielding barley and durum wheat which were better acclimatized to prairie growing conditions. A larger percentage of prairie farm acreage was sown to these crops, thereby, making available greater quantities of grain for waterfowl consumption. A third factor contributing to increased crop damage levels was the encroachment of agricultural production into areas producing the natural food supply of waterfowl. These areas are naturally of a poorer drainage than would previously be sown to agricultural crops. Technological innovations in the design of machinery and in the characteristics of the grain grown have made it possible to expand agricultural production into these areas. As a result of the above factors

waterfowl were forced to turn to cultivated sources of food with the preferred crops being wheat and barley.

The major component of grain loss is not in the form of grain consumed but, in the amount of grain that is trampled by the migratory waterfowl. Trampling causes the grain to shatter from the straw and, in wet weather conditions, to become imbedded in the ground. In addition, wet weather causes excess sprouting to occur. The consequence of both occurrences is that the grain becomes inaccessible to pickup by the harvesting equipment. It has been estimated that waterfowl will trample between 8 to 10 times more grain than they consume.² In the process, foreign matter is introduced into the swaths (soil and manure) which reduces the quality of the grain harvested.

There are three major groups of waterfowl which cause damage to grain; ducks, geese, and sandhill cranes. The mallard duck is the worst offender, being the forerunner of field feeding waterfowl and being present in the largest number. The estimated population of mallard ducks passing through Manitoba within a given season is in the vicinity of one million.³ Geese, mainly Canada and Snow, are the other major field feeders. The amount of damage caused by geese is less than for ducks because of lower population levels and lower trampling to consumption ratios. The net outcome is potentially the same in that both species are capable of causing 100 percent destruction of a grain field. Sandhill cranes are not a frequent cause of crop damage and in general do not cause severe damage.

² Ron Kabaluk. "Waterfowl Damage Control Program Review," Report prepared for the Department of Natural Resources, Winnipeg, 1976, p. 14.

³ Ibid., p. 16.

One of the major factors affecting the control of crop damage is the status of waterfowl as a protected resource. The Government of Canada, under the provisions of the Migratory Birds Convention Act of 1916 (MBCA), has assumed responsibility for the preservation of waterfowl and the maintenance of population levels. The methods employed to meet this objective center around the establishment of areas where waterfowl are protected throughout the year, and the regulation of hunting activities. Maintenance of waterfowl populations at current levels implies continued crop depredation, while the prohibition by the federal government against the shooting of waterfowl prevents the producer from employing this procedure as a scare technique to prevent damage. It is believed by many producers that firing at waterfowl with live shot is the most effective scare device that can be employed. The position taken by the federal government, to protect and preserve migratory waterfowl, has enhanced the problem for agricultural producers.

The prairie provinces of Canada contain three-fifths (166,000 square miles) of the area commonly referred to as the Prairie Pothole Region of North America. The area contains between 8 to 10 million sloughs and marshes. It is estimated that close to 100 percent of all farms located therein contain some wetland.⁴ This wetland constitutes prime nesting habitat for several species of ducks, including the mallard and pintail. Although this area comprises only 10 percent of North America's waterfowl breeding areas, it produces over 63 percent of the total waterfowl population. One noticeable outcome is that 5 out of every 8 birds

⁴ Ibid., pp. 2-7.

killed by North American hunters are produced in the prairie provinces.⁵ These wetlands, many of which are situated upon private lands, are estimated to produce 80 percent of all ducks produced in western Canada with the related costs of production being born by private landowners. An example of such a cost is the value of crop lost through waterfowl depredation.⁶

The prairie region is crossed at some point by each of the four North American migration flyways; the Pacific, Central, Mississippi, and Atlantic. Each species has a specific route within the flyway which it travels. The species of interest which have routes crossing the prairie region are the mallard and pintail duck, and the Canada and Snow geese. These species are the major offenders in the crop damage problem.

Each migration route contains at least one gathering spot or staging site where waterfowl will congregate to await the time when climatic changes induce their continued flight southward. Birds numbering in excess of 500,000 can congregate at the peak of staging activities. In order to meet food requirements, these birds have been known to travel within a radius of 50 miles from the staging area. The prime feeding targets of waterfowl are the unharvested fields of wheat, barley, and oats in the nearby areas. Producers situated in the vicinity of these staging areas are subject to severe financial losses through the de-

⁵ Naturalist, "The Prairie Pothole Region," (Minneapolis, Minnesota) Winter, 1974. pp. 2-7.

⁶ Province of Saskatchewan, "Wildlife Insurance Program," Report prepared for Saskatchewan Crop Insurance Commission, Regina, Appendix D.

struction of their crops.⁷

Climatic conditions during the spring and fall play an important role in the amount of damage that occurs throughout the season. Low rainfall levels during the spring cause much of the wetland to remain dry and unattractive to waterfowl in search of a nesting ground and, as a result, many species will not raise a brood of young under these conditions. The net effect is a reduction in waterfowl population levels.

Spring weather conditions also play an important role in the amount of crop damage occurring during the fall. Low rainfall and warm temperatures will lead to an early planting season which will, in turn, lead to an early harvest. Under these conditions, harvesting will be completed prior to the fall migration season and damage will be limited.

Additional factors which effect the extent of damage occurring within any given year are; fall migrating population levels, length of the damage season, amount of trampling relative to the amount of grain consumed, timing and length of the fall migration period, amount of natural food supplies available, and extent of preventive actions being employed. These factors alone, or in conjunction with one another, affect the degree of depredation in the following manner.

Waterfowl will remain at a staging site for as long as weather conditions are favourable and food is readily available. The major crop depredations occur when fall harvesting coincides with fall migration. This is most common when, due to warm, wet weather, southward flights are retarded and harvesting is delayed. The length of the damage season

⁷ Source: Information supplied by the Manitoba Department of Natural Resources. Personal communication.

varied from 30 days, as in 1976, to 60 days in 1975.⁸ The situation is worsened when fall waterfowl population levels are high in conjunction with the above.

The amount of natural food available in the vicinity of the staging site will affect the level of damage. When large numbers of birds congregate in the fall at a particular spot, the natural food supply is soon exhausted. Birds must find their food requirements elsewhere, and the first place they look is in nearby fields of unharvested grain.

In an effort to alleviate the problem of crop damage, agricultural producers and government officials have undertaken preventive measures. In severe depredation areas, these measures take the form of lure crops and hazing.⁹ Government departments have made available to producers bangers and cracker shells which are maintained in producers fields until the threat of danger is past. Producers erect scarecrows, drive trucks through fields, leave machinery in fields, and shoot at the birds with blank shells. The relative merits of each method is dependent upon the number of waterfowl present and the experience of the individual applying the procedure.

⁸ Source: Information supplied by the Manitoba Department of Natural Resources, Wildlife Program Files.

⁹ Definition: Hazing refers to the attempts to scare or herd waterfowl away from producers fields with the aid of aeroplanes or helicopters.

1.3 DIRECTION OF STUDY

The first chapter deals broadly with the historical background to the commencement of the waterfowl crop depredation problem, and a review of the ecological and climatic characteristics affecting the extent of the problem. The second chapter brings the problem into a Manitoba context with the use of information available from both primary and derived sources. Primary sources refer to the information available from agencies involved with the Compensation and Prevention Programs, while the derived source refers to the information obtained from the construction and application of a survey questionnaire to a representative sample of agricultural producers. The Compensation and Prevention Programs are both reviewed, however, this study concentrates more upon the Compensation Program.

The third chapter covers the economic theory surrounding the crop depredation situation, and the implications of preservation and compensation upon the economic criteria of efficiency and equity. The fourth chapter centers around the jurisdictional responsibilities attributable to federal and provincial government bodies in an attempt to settle the dispute over the cost-sharing arrangement.

The fifth chapter outlines the analysis carried out of the alternative policy proposals and the effect of each upon the various interest groups involved. These groups include provincial and federal governments, the agricultural producers, the hunters, the naturalists, and the general public. The method of analysis, the actual analysis, and the results of the analysis are all included within this chapter.

The last chapter summarizes the results of the previous chapters, outlines the limitations of the study, and offers suggestions for further research.

Chapter II

THE PROBLEM-WATERFOWL CROP DEPREDATION AND COMPENSATION WITHIN MANITOBA

2.1 INTRODUCTION

The situation that exists within Manitoba with respect to crop damage caused by migratory waterfowl is closely related to that described for the prairie region as a whole. To bring to the forefront the discussion as it applies more specifically to Manitoba, information and data from several existing sources were compiled and summarized. These sources included the Manitoba Crop Insurance Corporation, the Manitoba Department of Natural Resources, the Manitoba Department of Agriculture, the Canadian Wildlife Service, and Ducks Unlimited.

To obtain still further information of a qualitative and quantitative nature, a questionnaire was constructed and a field survey undertaken of a small sample of agricultural producers who, over the years, had incurred waterfowl inflicted crop damage. The questionnaire was designed to; obtain the producers perceptions of the problem as it existed at the farm level, the solutions that have been implemented to deal with the problem, and the alternative solutions that have been proposed.

The information gathered from the above sources is used throughout the following sections to describe the crop damage situation within Manitoba, the functioning of the Prevention and Compensation Programs' within Manitoba, and the issues surrounding the administration of the Compensation Program within Manitoba.

2.2 WITHIN A MANITOBA CONTEXT

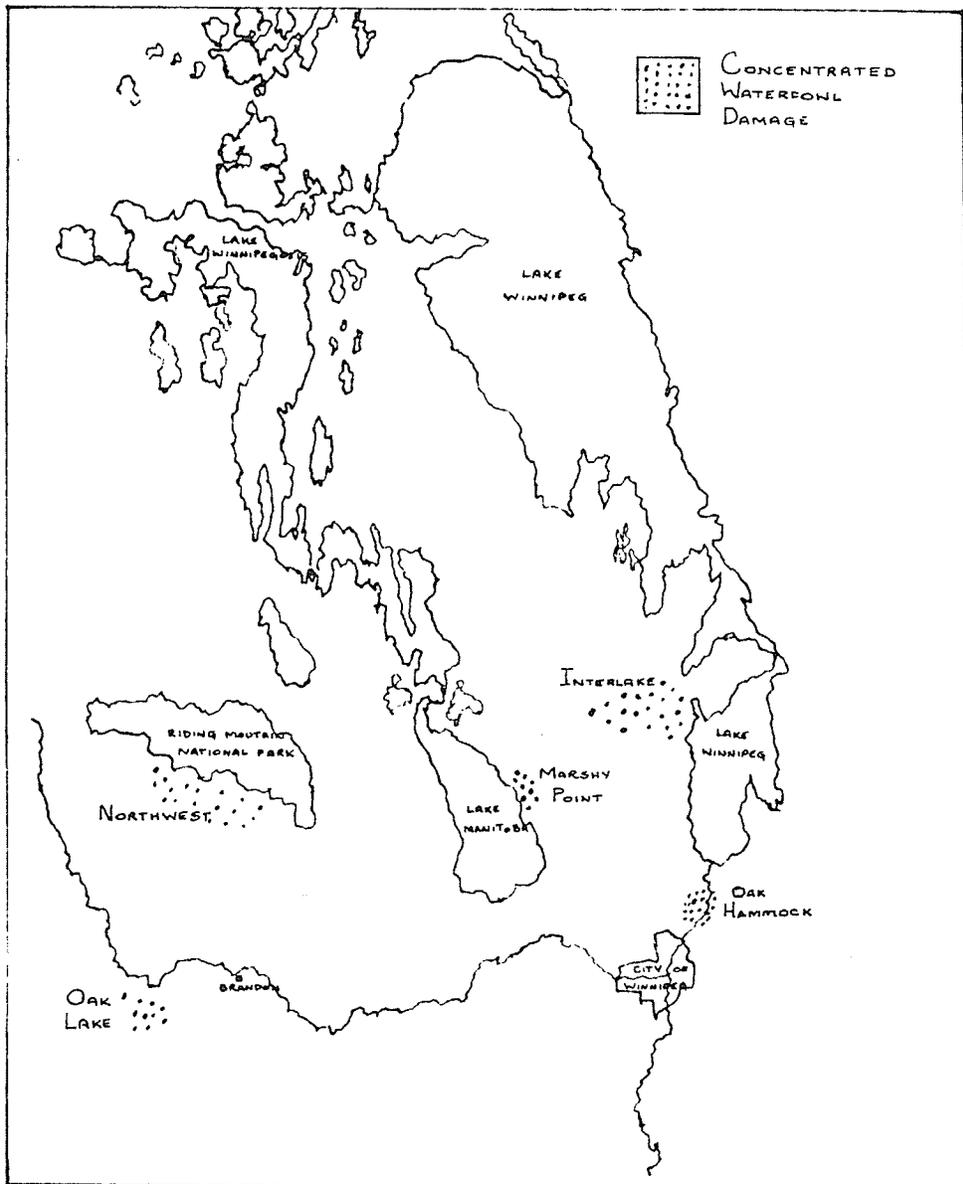
The extent of crop damage occurring within Manitoba for a given year, ranged from a low of 2.0 million dollars to a high of 8.7 million dollars.¹⁰ The actual dollar value of damage diverged to this extent because of the different methods employed (including versus excluding trampled grain, the estimation of crop yield, and the adjustment technique) by different sources to estimate damage levels. Plots of damage claims, as shown on Map 1, indicated that the producers receiving the major proportion of damage are situated in the vicinity of the Oak Hammock Wildlife Management Area, in the Interlake areas of Bifrost and Fisher Branch, in the Northwest region just south of the Riding Mountains, and in the Carrot River-The Pas area. All four areas lie within one of the two major migration routes which pass through the province. The first route follows down the west side of the province from The Pas, with staging occurring at the Oak Lake Goose Refuge. The second route passes between Lakes Winnipeg, Dauphin, Manitoba, and Winnipegosis, with staging occurring at the Oak Hammock Marsh.

Waterfowl populations concentrate to a greater extent in the Interlake Region than in the Northwest, with staging peaks at Oak Hammock Marsh ranging from a low of 130,000 in 1975 to a high of 400,000 in 1979. The length of the migration and damage seasons between 1975 and 1979 ranged from a low of 36 days in 1976 to a high of 54 days in 1979, and averaged at 48 days per year for the entire period.¹¹

¹⁰ Kabaluk, op. cit., p. 13.

¹¹ Source: Information supplied by the Manitoba Department of Natural Resources, Wildlife Program Files.

Map 1
Heavy Depredation Areas of Manitoba



Information obtained from the survey (Appendix A) confirmed that, for the majority of the province, damage is caused by fall migrating waterfowl. The Northwest Region, the traditional Pothole Country, is the only exception to the above. In this area, it is estimated that 80 percent of all crop damage is caused by local nesting waterfowl, in particular the mallard duck. It was also confirmed through survey information that cereal grains are the prime feeding targets of migratory waterfowl, with barley ranking as the most frequently damaged in 65 percent of situations, wheat in 31 percent of situations, and oats in 4 percent of situations.

2.3 CURRENT SOLUTIONS TO THE PROBLEM

Two programs are presently in operation to deal with the problem of waterfowl inflicted crop damage. The two programs fall under the general heading of the Waterfowl Crop Depredation Control Program and are administered in conjunction with one another. The first of these, hereafter referred to as the Prevention Program, was established under a federal-provincial agreement with the objective of instituting a program designed to alleviate the extent of crop depredation caused by migratory waterfowl. The second, hereafter referred to as the Compensation Program, was also established under a federal-provincial agreement and has as its major objective the alleviation of the financial burdens to agricultural producers created by migratory waterfowl crop depredation.

The two programs were initiated in 1972, with financing shared on a 50-50 basis by the governments of Canada and Manitoba. The following section outlines the structure and extent of the Prevention Program

within Manitoba, the methods of prevention employed under the program, and the effectiveness of these activities as perceived by the agricultural producer. The subsequent section follows a similar format for the Compensation Program.

2.3.1 The Prevention Program

The Prevention Program¹² is represented by the federal government through the Department of the Environment, and by the province through the Department of Agriculture and the Department of Natural Resources. The program is administered by the Department of Natural Resources but all policy decisions are jointly approved by both levels of government. The Department of Natural Resources employs game officers who are responsible for the co-ordination of the prevention activities of lure cropping and the distribution of scare devices. It is the responsibility of these individuals to aid the producer in setting up and maintaining scare equipment at the damage site for the period of time that it is deemed useful. The Department retains control over the handling of the equipment as a means of preventing inefficient use.

The Prevention Program undertaken in Manitoba consists of lure crops, acetylene exploders, and scarecrows. Cracker shells were used for a time but their use was discontinued when they proved to be hazardous to the operator. The characteristics of a particular area determine the method of prevention that is used. Intensively damaged areas, such as Oak Hammock Marsh, employ lure crops in conjunction with scare devices.

¹² Source: The information for this section, and the section regarding the Compensation Program, was obtained from a questionnaire administered to 45 agricultural producers within Manitoba. The questions and answers are outlined in Appendix A.

In less intensively damaged areas, such as the Northwest, prevention activities are restricted solely to the use of scare devices. The merits of each activity within an area are determined by the game officer in charge of the area.

The allocation of funds between the two types of prevention programs is arbitrarily determined, given the magnitude of the funds available and the judgement of the official in charge. For example, the distribution of funds between feeding and scaring activities is determined by the expected and actual waterfowl population levels. If the expected population levels are low, smaller quantities of scare equipment will be purchased and disseminated among the different regions. If expectations prove false and large migrating populations occur, the quantity of scare equipment available will be insufficient. In the event of this occurring, it becomes necessary to purchase private grain crops to act as lures in order to keep waterfowl away from producers fields. The amount expended for private lure crop purchase is not necessarily constrained by the Prevention Program budget. The province has the authority to increase its own level of contribution above the amount established in the federal-provincial agreement. This has the effect of increasing the amount of funds expended for lure crop purchase relative to the funds expended for the purchase of scare devices.

Table 2.1 indicates the distribution of funds between the lure crop program and the scare device program. The variability in the amount of funds expended between years for the two programs can be accounted for by the explanation given above. The level of prevention funds allocated to the lure crop program ranges between 66 and 87 percent, with a life-

Table 2.1

Distribution of Prevention Program Funds Between the
Major Methods Employed (Lure Crop Purchase and
Development: Scare Devices) Within Manitoba
(dollars)

Year	Total Prevention Cost	Lure Crops	Percentage	Scaring	Percentage
1972	79,328.63	52,078.82	66	27,249.81	34
1973	73,758.87	53,837.19	73	19,921.68	27
1974	332,415.36	281,504.36	85	50,911.00	15
1975	178,825.66	121,944.46	68	56,881.20	32
1976	107,680.90	80,993.98	79	22,186.92	21
1977	166,369.10	144,453.16	87	21,915.94	13
1978	276,584.98	204,743.27	75	69,841.71	25
1979	225,277.68	164,928.45	73	59,989.22	27

This table indicates that the lure crop costs plus the scaring costs do not equal the total prevention costs. In these years, the total is greater by the administration cost (1976 = \$4,500.00 : 1978 = \$2,000.00). Information did not specify where these costs were expended.

The total prevention cost column is the aggregation of all costs involved in undertaking prevention measures. At the end of each fiscal year, the total cost is divided equally between the federal and provincial governments.

time average of 75 percent. The remainder (25%) is allocated toward the purchase of scare devices.

In the initial year of implementation, the maximum contribution each level of government (federal and provincial) made to the Prevention Program was established at 50,000 dollars. This level has increased until it now stands at 120,000 dollars. The expenditure through the program in the initial year of operation was approximately 80,000 dollars, but as of 1979, this value has increased to 225,000 dollars. The expenditures over time are displayed in Table 2.1.

Although the magnitude of funds expended through the Prevention Program has increased over time, the extent of its activities has not. This is reflected in the magnitude of the major component of the Prevention Program; the lure crop program. Table 2.2 indicates that the total number of acres planted to lure crops exhibits a slight trend insofar that, in one out of every three years, it will fluctuate. On average, however, the total number of acres remains relatively constant at 1,500. The increase in prevention expenditure may merely be a reflection of the increase in: grain price levels which must be paid for private crops being purchased as lures; land rental values for land rented from private individuals for the purpose of producing lures; and, input costs involved in the production of lures.

2.3.1.1 Results of Survey

The survey indicated that individual producers undertake preventive actions completely separate from the actions undertaken by government agents. These actions take the form of scarecrows (67%), bangers (56%),

Table 2.2

Number and Acreage of Lure Crops Grown in Manitoba
Through the Prevention Program

Year	Total Acreage
1972	1,320.55
1973	1,518.00
1974	3,021.40
1975	1,709.00
1976	988.50
1977	1,413.40
1978	957.50
1979	1,500.00
Average	1,553.54

Source: Information supplied by Manitoba Department of Natural Resources (Wildlife Program Files).

and scare permits (31%).¹³ Of this group, 62 percent felt that the measures they undertook were worthwhile for a short period of time. The effectiveness of the various prevention devices is short lived, if, for some reason, harvesting cannot proceed immediately. The birds, after a short period of time, become accustomed to the noise of the bangers and the presence of the scarecrows. As this occurs, they will once again venture into producers' fields to feed upon the unharvested grain.

The belief exists among producers that government activities, of which 80 percent of producers were aware, were effective. They also believed (87%) that the government should extend the scope of its prevention activities, because crop damage is a consequence of government involvement in the preservation of "government birds". Given this belief, only 33 percent of producers felt that their own role in damage prevention should be increased. While they were making the above declaration, 62 percent of these same producers indicated that they had altered their farming practices to help alleviate crop damage. These alterations included: growing the less susceptible crops of flax and rapeseed; altering harvesting procedures (straight combining or combining swaths while still damp); growing more forage crops; and draining wetlands.

The general response by producers surveyed to the questions regarding prevention activities was similar throughout the province. The only exception was the Oak Hammock Wildlife Management Area where a more negative attitude (60% felt prevention activities were not worthwhile) towards the effectiveness of prevention activities carried out by both

¹³ Definition: Scare permits bestow upon the producer the right to shoot at waterfowl with blank ammunition, for the purpose of scaring waterfowl away from infested fields.

producers and government was evident. This attitude is hypothesized to be a result of the large number of waterfowl that congregate in this area during the staging phase of the flight southward in the fall. Lure crops cannot supply the food requirements of these populations, and scare devices cannot control the large numbers present within a field at any one time. The net result is a substantial level of crop damage.

Despite the efforts of the Prevention Program, crop damage has continued to occur. Individuals, both in and out of government, feel that producers should not be required to bear the full cost associated with the problem of waterfowl crop depredation. A second program offering compensation after the fact was therefore implemented in conjunction with the Prevention Program to correct this inequity.

2.3.2 The Compensation Program

The Compensation Program was designed to ease the financial losses to agricultural producers created by migratory waterfowl crop depredation. The structure of the Compensation Program, however, has certain factors built into it which affect its performance as an equitable solution. In order to understand the relationship between structure and performance, the first section outlines specifically the composition of the program. Based upon this background information, the second section deals with certain controversial components of the program, particularly its application and acceptability to agricultural producers. The third section moves to a different format and discusses some of the broader political and economic issues surrounding the Compensation Program, as seen from the perspective of the various groups involved.

2.3.2.1 Structure of the Compensation Program

The Compensation Program originated in 1972 as the Waterfowl Damage Fund. The Fund offered coverage to the producer for one-half the commercial value of damaged grain, up to a maximum of 15 dollars per acre. The federal and provincial governments shared equally in the financing of the program, to an aggregated maximum contribution of 100,000 dollars.

The first Migratory Waterfowl Crop Damage Compensation Program was signed in 1974, with a structure and terms of reference similar to those of the agreement it replaced. The maximum level of coverage offered to the producer was originally established at 25 dollars per acre, but as of 1978, the maximum level was increased to 50 dollars per acre. The federal-provincial contributions to the program have increased from 100,000 dollars to the present level of 300,000 dollars (600,000 aggregated). Manitoba's portion of the total federal contribution has increased from 10 percent in 1974 to 15 percent in 1981.

The program receives representation from Canada through the Federal Department of Agriculture, and from Manitoba through the Department of Agriculture and the Department of Natural Resources. The actual field work related to receiving and adjusting claims is the responsibility of the Manitoba Crop Insurance Corporation. The results of the Corporation's work are submitted to the Department of Natural Resources which, in turn, is responsible for the issuing of cheques to producers based upon claims received. The cheques issued must visibly accredit both the federal and provincial governments with payment. At the end of each fiscal year the Department issues a report to the Federal Department of Agriculture outlining all the revenues and expenditures associated with the administration of the program and the payment of compensation.

The structure of the Compensation Program is clearly defined in Schedule A of the Waterfowl Crop Damage Agreement.¹⁴ The major terms of reference outlining the structure which may be referred to throughout this study are as follows:

Terms of Reference

1. The Compensation Program will be administered and adjusted by the Manitoba Crop Insurance Corporation.

2. Compensation coverage is offered to producers for damage caused by migratory waterfowl (ducks, geese, and sandhill cranes) to specified agricultural crops.

3. Compensation is limited to standing, swathed, or stoked fields of unharvested grain.

4. The amount of compensation a producer can receive is determined by multiplying the percentage loss on each acre by the lesser of; the commercial value of the crop or 50 dollars. The commercial value refers to the appraised value of the crop before damage, which is determined by multiplying the appraised yield by the established price set within the agreement for each crop. The 50 dollar maximum per acre is established on the premise that it is representative of the costs per acre associated with production of the crop.

5. The maximum compensation available to a single producer is set at 10,000 dollars. The minimum compensation available is set at 100 dollars. A crop receiving less than five percent damage is not eligible for compensation.

¹⁴ Source: Canada-Manitoba Agreement, Waterfowl Crop Damage Compensation Program Terms and Conditions, July 1979.

6. Compensation will not be paid on crops which are planted late, or planted on land unsuitable for crop production.

7. An inspection fee of 25 dollars per quarter section must be paid when a claim for damage is made. This fee is refundable if the claim proves valid.

2.3.2.2 Performance of the Compensation Program

The total amount of compensation paid through the program varies yearly in accordance with the severity of damage for that year. Table 2.3 indicates that in years when losses are severe (1977 and 1978), compensation payments are in the vicinity of 500,000 dollars. In years when losses are less severe (1974 and 1976), compensation payments are reduced to approximately 100,000 dollars. The table also indicates that the level of average and total payments per claim has risen over the life of the program. The increase in total and average payments may be a reflection of an increase in: the awareness by producers that the program exists and who are consequently making claims; the level of coverage (from 25 to 50 dollars per acre maximum as of 1978); the production of barley and wheat which are more susceptible to waterfowl damage; and, the advancement of agricultural production into increasingly marginal agricultural land which prior to this advancement was prime waterfowl habitat.

The figures in Table 2.4 indicate that the percentage of compensation costs relative to total depredation costs has increased over the life of the program, from approximately 30 to 50 percent. This may be an indication of the expanded scope of the compensation scheme relative to the

Table 2.3

Change in Number and Average Size of Valid Claims
Over The Duration of the Manitoba
Compensation Program
(dollars)

Year	Number of Claims [']	Total Payment	Average Payment
1972	20	5,694.41	283.47
1973	72	36,175.33	502.43
1974	180	119,575.00	664.31
1975	366	334,117.99	885.56
1976	54	75,287.20	1,394.21
1977	491	411,160.63	837.39
1978	411	469,946.43	1,143.43
1979	287	281,404.30	980.50

Source: Information supplied by Manitoba Department of Natural Resources (Wildlife Program Files).

[']The number of claims does not refer to the number of producers making claims. One farm may suffer crop damage on more than one field, in which case a separate claim must be made for each. The average payment column reflects the average payment per claim as opposed to the average payment per producer.

Table 2.4

Relationships Between Costs of Prevention and Costs of Compensation
 Compared to Total Depredation Control Costs for Manitoba
 (Ratios of Individual Program Costs to Total Costs)

	Prevention Program Costs Relative To Total Costs	Compensation Program Costs Relative To Total Costs	'Other Relative To Total Costs
1972	75	7	18
1973	61	32	7
1974	63	34	3
1975	32	64	4
1976	57	40	3
1977	28	69	3
1978	35	60	5
1979	43	54	3

'Other refers to costs associated with lure crop evaluation costs and Manitoba Crop Insurance Corporation administration costs.

prevention scheme, or it may simply be an indication that producers are becoming more aware of the program and are making claims accordingly. The increased demand for compensation has led to more funds being allocated to the Compensation Program. In addition, the increase from 25 to 50 dollars in the per acre maximum compensation level will be reflected in the total compensation costs. This increase will distort the relevance of the ratios in Table 2.4 as measures of the expanded scope of the Compensation Program relative to the Prevention Program.

The ratios supplied in Table 2.5 are a measure of the extent to which compensation covers the actual value of damaged grain. The average ratio of compensated to actual damage for the Province of Manitoba is 0.44. Sub-regions of the province exhibit ratios at variance with the average (a ratio of 0.36 for the Interlake, and 0.31 for the Northwest).¹⁵ This variability would indicate that compensation does not cover the actual value of crop damage to the level that the provincial ratio implies. The variability between provincial and regional ratios of compensated to actual damage may be a consequence of the availability of 100 percent compensation in those areas of the province prone to the severest crop damage from migratory waterfowl, i.e., Oak Hammock Marsh and Marshy Point.¹⁶

¹⁵ Source: These ratios were calculated using Manitoba Crop Insurance Corporation data for the estimates of actual damage which were determined in order to calculate the compensation a producer should receive. These figures were aggregated for the different regions and compared to the compensation dispersed for that region.

¹⁶ Aside: The legal description of the area receiving 100 percent compensation around Oak Hammock Marsh is outlined in Regulation 182/79 of the Wildlife Act for Manitoba. The similar area around Marshy Point is outlined in Regulation 14/73 of the same Act.

Table 2.5

A Comparison of Actual and Compensated Damage Figures for Manitoba

Year	Actual Damage ['] (dollars)	Compensated Damage (dollars)	Ratio (Comp./Act.)
1972	14,959.59	5,694.41	.38
1973	87,164.26	36,175.41	.42
1974	176,551.03	119,575.00	.68
1975	919,776.08	334,117.99	.36
1976	78,114.44	75,287.20	.96
1977	1,032,669.83	411,160.63	.40
1978	799,164.81	469,946.43	.59
1979	542,327.08	281,404.30	.52
Total	3,650,340.76	1,733,361.20	.47
Total (less 1972 and 1973)	3,546,602.40	1,691,491.50	.48
Average	456,340.76	216,670.15	.47
Average (less 1972 and 1973)	591,100.40	281,915.25	.48

Source: Information supplied by Manitoba Department of Natural Resources (Wildlife Program Files).

[']Actual damage estimates are determined by the Manitoba Crop Insurance Corporation adjustors. The procedure used to determine the level of damage has been outlined in the text of this study.

The 50 dollar per acre maximum is established as an upper limit on the amount of compensation available, and is theoretically designed to cover the costs to the producer of growing a field of grain. The Cost of Production Study, carried out at the University of Manitoba, indicates that the compensation the producer receives at the above level will not cover the costs of production.¹⁷ Using data from the study, the ratios of the level of compensation to the costs of production were derived for the three primary grains affected by waterfowl depredation and are displayed in Table 2.6. These ratios indicate that the producer receives a 39 percent return on the costs of producing wheat, a 36 percent return on barley, and a 42 percent return on oats. (It is worth noting that the figure of 50 dollars may have been meant to represent only variable costs per acre. The above analysis assumes production costs refer to both input and investment costs per acre.)

The per acre value of a crop receiving waterfowl damage is calculated using a price established within the Compensation Agreement. These prices were initially established in 1974, and have subsequently been kept in line with the prices used for the valuation of crop losses incurred under all-risk crop insurance coverage. These prices are set below the market price to allow for the fact that harvesting, storage, and transportation costs have not been incurred. The established level of these prices has proven to be a contentious issue. The producers claim that the price has been kept well below the standing value of grain

¹⁷ C. F. Framingham, L. B. B. Baker, and W. J. Craddock. "Farm Income, Employment and Manitoba Agriculture: A Linear Programming Approach to Consideration of Policy Alternatives," Research Bulletin No. 79-1. Department of Agricultural Economics and Farm Management, University of Manitoba, 1979.

Table 2.6

Determination of Relationship Between Compensation Received and
Costs of Production and Between Compensation Received and
Value of Production for the Province of Manitoba

	Area		
	Interlake	Northwest	Manitoba
Compensation/Production Costs			
1. Wheat	.31	.41	.39
2. Barley	.32	.39	.36
3. Oats	---	.37	.42

Source: Production cost figures were obtained from the study carried out at the University of Manitoba by Framingham and Associates. Compensation figures were obtained from the Manitoba Crop Insurance Corporation.

within the field, and has not been allowed to fluctuate in accordance with the market price.

Establishing a maximum limit on coverage, 50 dollars per acre, inadvertently penalizes producers of higher valued grain types. If two producers, one growing an average yielding crop of wheat and the other growing an average yielding crop of oats, both receive a 100 percent level of damage, then both will receive the maximum coverage of 50 dollars per acre. However, the value of the wheat that could have been harvested in the absence of damage, relative to the value of oats that could have been harvested in the absence of damage, would have been greater. The net loss to the wheat producer relative to the net loss to the oat producer is also greater. The per acre maximum system also penalizes producers situated upon land of lower fertility as these producers will have higher input costs into production than a producer situated upon higher fertility land. The producer on less fertile land receives a lower return relative to the costs of producing the crop under a per acre maximum coverage level than the producer on high fertility land.

2.3.2.3 Results of Survey

Forty-five producers, chosen from three areas of the province where waterfowl depredation is a problem, were asked to give their opinions regarding the performance of the Compensation Program. Sixty-five percent of those questioned were dissatisfied with the program because the level of coverage was too low. Too low a coverage referred to the fact that compensation did not cover the full value of grain destroyed, or

did not cover the costs of production. A second reason cited for dissatisfaction concerned the adjustment procedure that was used to determine the actual value of the crop destroyed. The claim made was that both the yield estimates and the assessed damage levels were incorrect.

Ninety-three percent of producers interviewed strongly believed that the Compensation Program should account for the additional costs, above the actual grain damage costs, incurred by the producer because of waterfowl crop damage. These additional costs take the form of extra harvesting costs, reduced quality of grain harvested from damaged fields, extra tillage costs due to the sprouting of trampled grain, and extra labour costs involved in additional tillage and prevention activities. The present program makes no allowance for these costs.

Overall, producers are of the general opinion (82%) that the level of compensation should be raised to between 80 and 100 percent of the value of crop losses. The arguments used to support this contention range from; "they're government birds" to "a farmer should receive more than just production costs, as he is in business to make a profit in order to reinvest to expand the enterprise, as well as to meet his everyday expenses."

The performance of the Compensation Program, because of the low coverage levels and the methods employed to determine the value of actual grain damage, is not perceived by producers as providing an adequate solution to the crop depredation problem. Producer antagonism still exists because of what is perceived to be the financial losses incurred as a result of government involvement in waterfowl preservation. If equity is the prime consideration in the implementation of the Compensation

Program for waterfowl crop depredation, it may be possible to achieve this by revising the structure of the program or by replacing it.

2.3.2.4 Issues Surrounding the Compensation Program

The previous two sections have dealt primarily with the structure and performance of the Compensation Program. This section goes further and introduces some of the controversial political and economic issues involved in: the establishment of compensation levels; the division of costs between governments; and, in the potential for alternate programs to be implemented to deal with waterfowl crop depredation.

There are groups, within both the provincial and federal governments, who wish to replace the present compensation scheme with some alternate procedure for dealing with the waterfowl crop depredation problem. Their position is based upon the premise that the government should not be solely responsible for these costs. Waterfowl crop damage is perceived as a "natural hazard" similar to hail damage and, therefore, the producer should be required to bear a portion of the costs associated with protection against the hazard.

Agricultural producers take the opposite view and contend that the government should be 100 percent financially responsible for waterfowl crop damage. Their claim is that under the Migratory Birds Convention Act of 1916, the Government of Canada assumed responsibility for the preservation and protection of migratory game and non-game birds. To accomplish the objectives set out in this act, regulations were established restricting the number of waterfowl that could be killed within a year, and bird sanctuaries and wildlife management areas were estab-

lished to offer the birds protection and a place to breed. These actions are hypothesized to have resulted in an increase in the extent of crop damage received by producers. The producer, therefore, feels that the costs associated with crop depredation are not his responsibility and he should not be forced to bear them. This group uses the above argument for the justification of an increased compensation level of up to 100 percent of crop losses.

The major concern of government groups regarding an across the province, 100 percent compensation scheme centers around the possibility of producer abuse of the system. The 100 percent compensation option introduces the concept of moral hazard because the producer, knowing that full value will be received for damaged grain, will not have the incentive to minimize crop damage through prevention activities or through an altering of harvesting patterns and procedures. The producer may not wish to bother with harvesting because of low yields or the desire not to carry grain over until the following spring, and may willingly allow crops to be destroyed. The possibility also exists that the producer will start to produce cereal grains in areas susceptible to crop damage which would not normally have been considered for this purpose because of the waterfowl depredation problem. The net effect of a 100 percent compensation scheme designed to promote equity, may also promote inefficiency in the production decisions of agricultural producers.

The question of eligibility criteria necessary to receive compensation was raised by government groups and producers alike. Factors to determine eligibility could include: the extent of government instigated preservation efforts within the immediate vicinity of the damage

area; whether the individual purchasing property within a damage area did so prior to, or subsequent to, the commencement of preservation activities; whether individuals residing within pothole country where waterfowl are considered a natural hazard should be compensated to the same extent as an individual in an area where damage is externally imposed through government preservation programs. The above were all proposed as yardsticks against which eligibility could be measured.

The producer takes the opposite position by disclaiming the necessity for such criteria. The argument for this stance is based upon the premise that the government is responsible for the actions of a resource (migratory waterfowl) for which ownership has previously been assumed. The main objective of government intervention in the management of the resource was to maintain waterfowl population levels. These levels are of such a magnitude that damage to crops has become a relevant issue, particularly around government established management areas. In addition, the claim is made that the restriction on hunting or shooting of waterfowl restricts the producer's ability to control depredation upon his property. The conclusion of this group was, regardless of the area of the province that damage occurs, producers should be eligible for compensation to the full extent that it is available and that it should be available for the full value of the grain damaged.

The province uses the above argument, regarding the responsibility assumed by the federal government for the migratory waterfowl resource through the Migratory Birds Convention Act, as a reason why the federal government should increase its share of contributions above the 50 percent it presently assumes. The province disclaims responsibility for

the migratory waterfowl resource, and in so doing, also disclaims any responsibility for the damage the resource creates.

Provincial government departments are dissatisfied with their roles in the administration of the program. They feel that duties are dispersed among too many departments to be able to achieve efficient administration. The Department of Natural Resources is also dissatisfied because it is given the responsibility of dealing with the numerous producer complaints, but have no authority in the negotiation of the Compensation Program regarding the basis of those complaints. The Manitoba Crop Insurance Corporation is dissatisfied for basically the same reason. Negotiations are presently handled by the Manitoba Department of Agricultural and the Federal Department of Agriculture.

The agricultural producer is dissatisfied with the present Compensation Program on several accounts. Firstly, dissatisfaction exists because claims for waterfowl damage submitted to the Manitoba Crop Insurance Corporation are processed subsequent to all other types of claims. Payments are not made on these claims until the spring of the year following the occurrence of damage. Secondly, the producer is concerned with what is felt to be inequities in the structure of the program, particularly the adjustment procedure and the level of compensation. The present level of coverage offered under the program, according to calculations outlined previously, does not cover the costs associated with producing the crop.

There is still the perspective of one other group to be considered, the recreationalist who enjoys the amenity value of the wildlife resource. This group is represented by naturalists, hunters, wildlife

photographers, individuals who may wish to use the resource at some future time (option demanders), and individuals who value the mere existence of the resource. The financial contribution made by each of these groups towards the cost of maintaining the resource is insignificant. The total contribution is the amount contributed through general tax revenues for each individual tax payer. The hunter contributes more than any of the above groups through hunting license fees, which in Manitoba would total \$9.75 (a Wildlife Certificate is \$2.25, a Manitoba Game Bird License is \$4.00, and the federally imposed Migratory Game Bird Permit is \$3.50). Hunter expenditures create benefits to sport oriented businesses, while travel and recreational expenses create benefits to the holiday oriented businesses. Some of the revenues obtained by these groups may be appropriated by government through the taxation process which may then be partially used for the payment of compensation to agricultural producers.

2.4 CONCLUSION

There exists a desire on behalf of society to preserve migratory waterfowl. The federal government, in accordance with this desire, has legislated in such a manner as to achieve this objective. These actions have increased the problem of waterfowl inflicted crop damage. The financial losses the producer receives because of these crop losses are considered, by the producer, to be inequitable. In order to alleviate the inequity, crop damage prevention and compensation programs were structured and administered. The Compensation Program does not meet the equity criteria established by producers. As a result, they would like to see a new system of compensation implemented. Many questions have

been raised with regard to the program which require a closer examination before changes can be instituted. Who should bear the costs associated with crops inflicted by waterfowl damage? Who is ultimately responsible for the situation of crop depredation? If a compensation scheme is judged to be the correct procedure to employ to transfer funds to agricultural producers, how should the scheme be operated, and what level of coverage should be offered? What alternate programs to the Compensation Program could be employed and with what outcome?

Chapter III
ECONOMIC THEORY

3.1 INTRODUCTION

The problem outlined in the preceding chapter will be approached theoretically within the context of welfare economics. There are many concepts within this branch of economic theory that are applicable to wildlife resources. These range from the theory of common property resources to the equity and efficiency implications of a compensation program designed to correct the externalities created by policies involving wildlife preservation. The following sections outline the economic principles that have evolved from previous studies and which can be applied to the present situation.

The characteristics of wildlife as a common property resource, and the effect of these upon the supply and demand conditions of the resource, will be examined. From there, the discussion will revolve around the implications upon economic efficiency and equity which are created by the externalities involved in wildlife preservation. Once these implications have been discussed, the concept of a compensation scheme to correct for the equity problems will be analyzed, based upon work carried out by economic theorists. As various compensation policy options not only affect equity but also the efficiency level at which producers operate, the effects of implementing particular policy options will be analyzed in terms of a trade-off between efficiency and equity.

3.2 ECONOMIC THEORY

Waterfowl fall into the category of resources referred to as common property resources. Common property resources are those for which no individual or group has appropriated property rights and are, therefore, accessible at limited or no cost to all who wish to use them. The characteristics of free accessibility and non-exclusion, combined with the resource supply conditions, can lead to over-exploitation and eventual resource exhaustion.

Over-exploitation of common property resources can continue to occur, in the absence of user regulation, up to the point where the population can no longer perpetuate its numbers. This endangered species phenomenon is characterized by a rate of harvest (proportion of population being killed) which exceeds the rate of growth (birth rate). This causes the population level to fall below the critical threshold level at which the species can no longer survive. The position where rate of harvest equals rate of growth marks the population level where maximum sustainable yield occurs (the maximum quantity of the wildlife species which can be used for consumptive purposes without decreasing the population level). The preferred population level, from society's perspective, is where maximum net economic yield occurs. Net economic yield is defined as the net benefits derived from utilization of the resource. From an economic view, net economic yield is lower than maximum sustainable yield because beyond a particular level of use, marginal benefits do not outweigh the marginal costs associated with acquiring the resource.¹⁸

¹⁸ H. Scott Gordon, "The Economic Theory of a Common Property Resource: The Fishery," The Journal of Political Economy 62(1954), pp. 88-99.

Over-exploitation in consumption constitutes the basic problem prevalent in the use of common property resources; that of market failure due to externalities in consumptive use. As the level of consumptive use is increased, the ability of waterfowl to maintain population levels is decreased, and fewer birds are produced during each breeding cycle (supply falls). The consumption of waterfowl by one individual decreases the availability of the good for use by another, thereby adversely affecting the second individual's consumption or utility function. Individuals are forced to compete to an even greater extent for the remaining waterfowl, eventually driving the population level below the critical threshold. The irreversible outcome is the extinction of the waterfowl species. These externalities not only exist between consumptive users, but also between consumptive and non-consumptive users. Waterfowl which are physically appropriated by one individual are no longer available for the purpose of viewing by another. The greater the number of waterfowl which are physically appropriated, the greater will be the disutility created for non-consumptive users.

The existence of a species of waterfowl is a stock resource which is non-renewable in nature. The individuals within the species are a flow resource which are renewable, if the population level remains above the existence threshold.¹⁹ Regulations are required to restrict the use of the resource in order that the population level does not fall below this level. These take the form of bag limits, limits on the number of licenses issued, and limits on the length of the hunting season. Their main purpose is to limit the supply available for consumptive use to a

¹⁹ Frank T. Bachmura, "The Economics of Vanishing Species," Natural Resource Journal 11(1971), pp. 674-692.



subset of the total supply, leaving the remainder of the resource available for the perpetuation of the species.

Within a given season, there exists an inelastic supply curve for waterfowl. The short term inelasticity can be explained in the context of the breeding habits of waterfowl. During a given breeding season, the cost of producing waterfowl will increase as greater quantities of agricultural crops are destroyed, and as prevention activities are increased to control the extent of crop destruction. However, the quantity of waterfowl supplied during the season cannot vary, as it has already been established by other factors (ecological and economic) which existed in the the spring. It is not until the fall of the year that the total costs of production are realized, at which time it is too late to alter the quantity supplied. The long term inelasticity can be explained by the stock characteristic of a wildlife species. Since the supply is considered unique, the resource consists of a stock of one, and an inelastic supply condition exists.²⁰

The supply of waterfowl is analogous to the concept of joint production where two uses of one good are produced simultaneously with interdependent supply functions. The production of waterfowl is designed to satisfy two demands, consumptive and non-consumptive. The consumptive user is charged a price for the right to consume the good, while the non-consumptive user is allowed to use the resource free of charge. The production of the resource to meet one demand is synonomous with the

²⁰ Ibid., p. 675.

and

John Krutilla, "Conservation Reconsidered," The American Economic Review 57(1967), pp. 777-786.

production of the resource to meet the second demand. The inseparability in production does not allow varying cost functions to exist for the two goods and, therefore, the supply curve for each use must be derived from the marginal cost curve (total supply curve) for the entire waterfowl population. The supply for consumptive use is regulated by government whose decision is dependent upon the total quantity of waterfowl in existence. The remainder constitutes the supply available for non-consumptive use.

There are several alternate demands for the waterfowl resource. These include a consumptive (hunting) demand where the resource is physically appropriated by the individual consumer, and a non-consumptive demand where the resource is not appropriated. The non-consumptive use of waterfowl includes several components: collective good demand (naturalist and photographer use); option demand (the desire that the good is available for use at some future time); existence demand (pleasure obtained from the knowledge that the resource exists); scientific demand (the possibility that the resource may in some manner contribute to scientific knowledge); and inter-generational demand (the desire that the resource will be maintained for future generations). Each one of the above components has a value attached to it separate from all others. Subsequent reference to the above demand components will be in aggregate as the non-appropriable demand for waterfowl.

It is necessary to estimate the total value of waterfowl to society in order to compare the value of the resource to the total costs involved in waterfowl preservation. It is difficult to determine the value of waterfowl to society because they fall into the category of goods

referred to as mixed. The concept of a mixed good, as applied here, refers to a good which satisfies two demands, one consumptive and the other non-consumptive. Governments have recognized both the non-consumptive non-appropriable good aspect:

nonhunting uses, such as watching a flock of geese in flight, which do not preclude others from using the same creatures, simultaneously and/or for different purposes in the future,²¹

and the consumptive appropriable good aspect:

the use of wildlife as an input into consumptive processes may, as in the case of a person shooting and killing an animal,²² preclude others from deriving benefits from the same animal.

A problem occurs in valuation of the resource because there are two differing forms of valuation which must be aggregated, one for each of the above components of demand.

The demand schedule for an appropriable good is the horizontal summation of the demands of all individuals. The quantities demanded at each price level are summed to obtain an aggregate. It is assumed that each individual will consume alternate quantities of the goods, dependent upon the relationship between the individual's marginal valuation and the price level. Given price level C of Figure 1, individual A will equate his marginal valuation of the resource equal to C and consume Q_a . Individual B will intuitively go through the same procedure and consume Q_b . At this price level society consumes $Q_a + Q_b$.

²¹ D. J. Cocheba and W. A. Langford, "Wildlife Valuation: The Collective Good Aspect of Hunting," Land Economics 54(4), p. 491.

²² Ibid., p. 491.

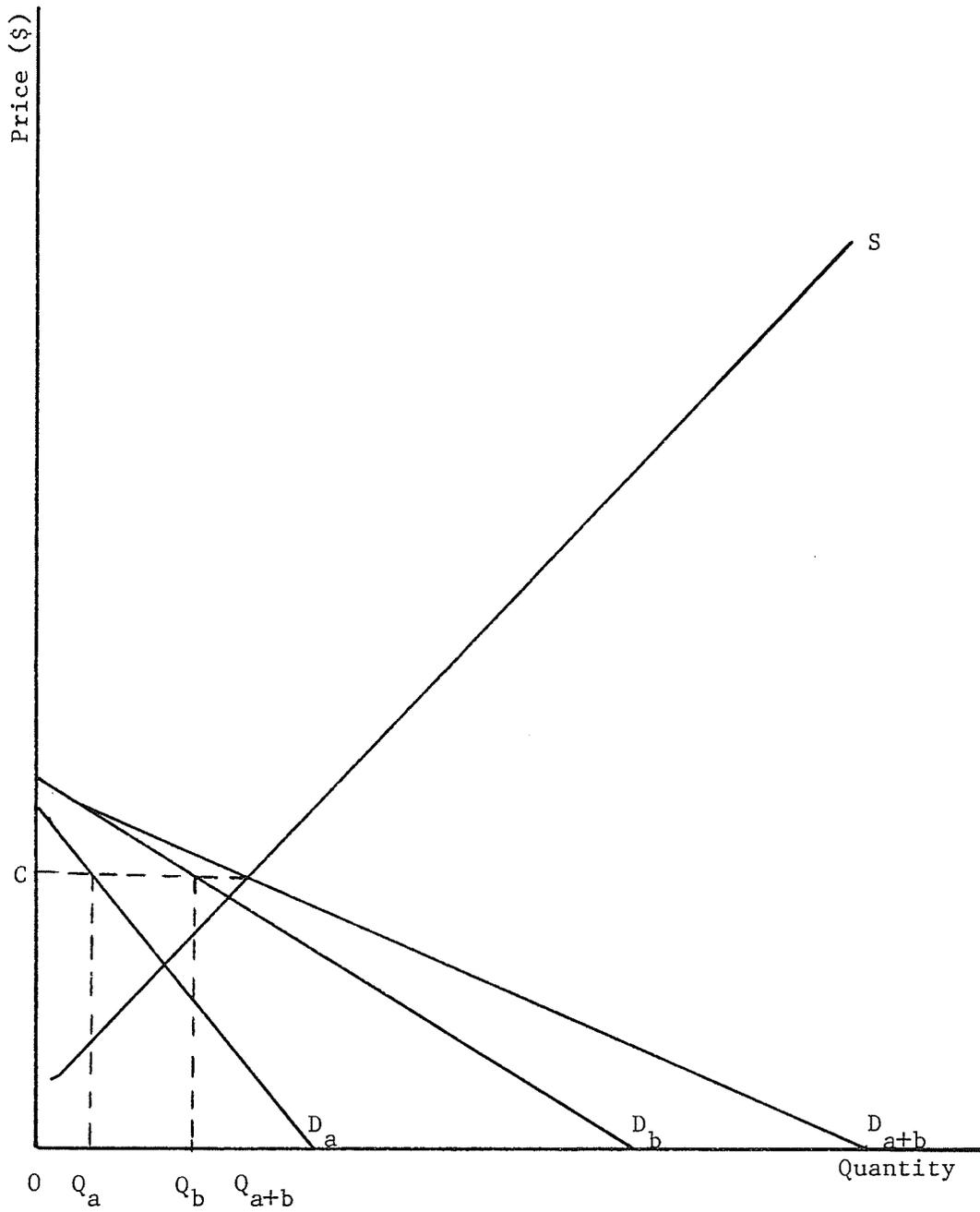


Figure 1

Horizontal Summation of Individual Demands
for a Private Good

The theory of the appropriable good assumes that exclusion from use of the resource is feasible and that a charge could be administered through a market system. In the consumptive use of waterfowl, the potential exists to establish such a market if the following conditions are met:

1. quantities consumed can be controlled;
2. supply can be monitored; and,
3. a marginal value can be attached to the individual bird.

In the consumptive demand for waterfowl, the first two conditions would be met, however, the third condition does not exist at this time.

The demand schedule for a non-appropriable good, because it is consumed in equal quantities by all individuals, is the vertical summation of the demands of all individuals. If a specified quantity of the good is produced, individuals A and B will consume that quantity. The utility derived and the valuation of the good, however, will vary per individual for the amount consumed. Given the situation illustrated on Figure 2, let it be assumed that quantity Q_c is provided for utilization by consumers. Individual A will value the good at price P_a , far below the degree that individual B values the good at price P_b . In this situation, the quantity consumed is fixed and price is zero. In the case of an appropriable good, quantities consumed would vary in relation to price.

The hunting of waterfowl has within its makeup the elements of both an appropriable and a non-appropriable good. The actual bagging of the animal (appropriation) plays a significant role in the valuation the hunter places upon the activity. The hunter may, however, value the

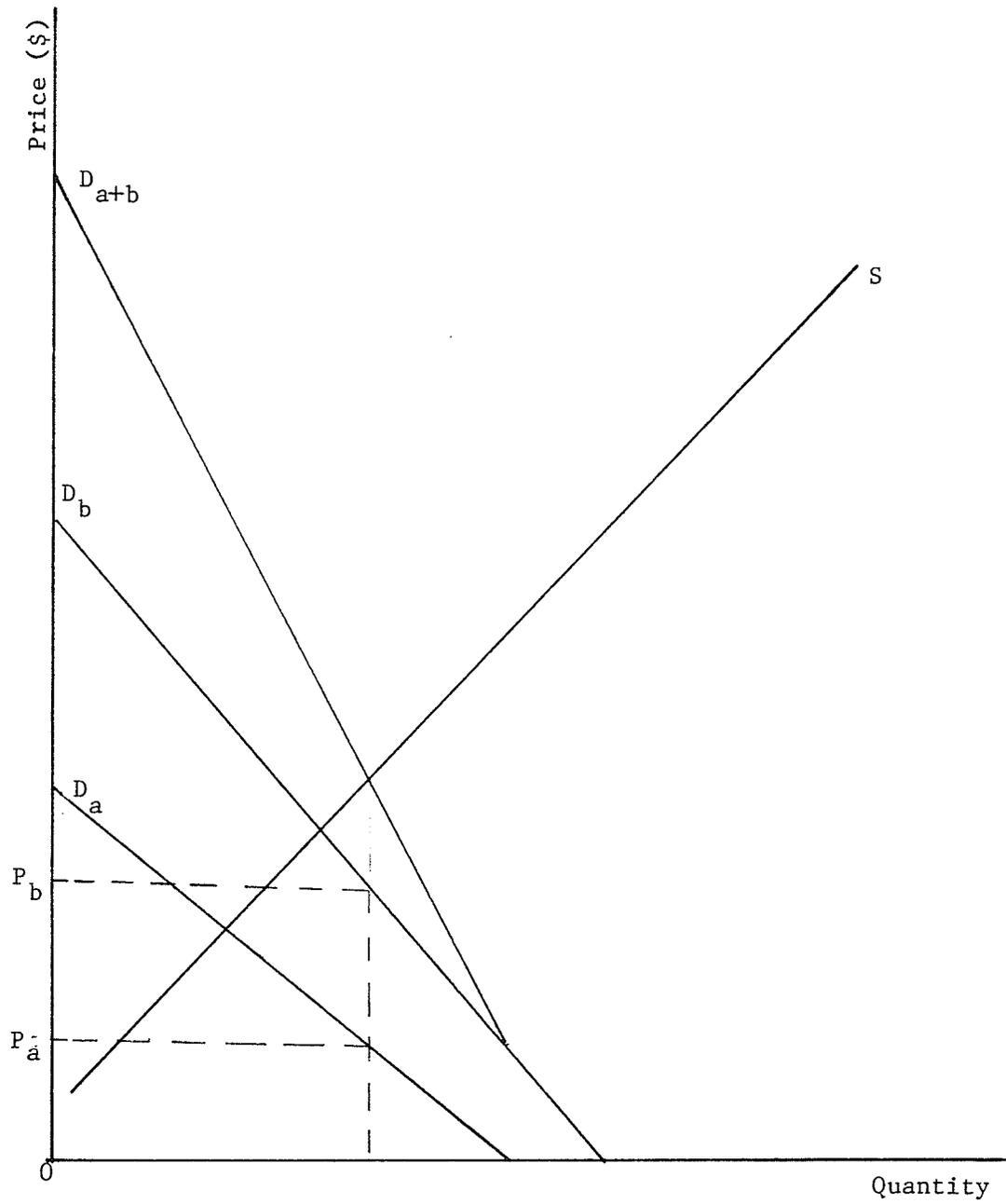


Figure 2

Vertical Summation of Individuals
Demand Curves for a Public Good

experience of sighting the animal (non-appropriation), regardless of whether it is killed or not. If the animal is sighted, shot at but missed, the good remains available for use by others and the hunter should not be charged for its use. If the animal is killed, the property rights to the resource have been appropriated and the hunter should be charged accordingly.

The non-appropriable good dimension of the hunting experience cannot be excused as insignificant even in the situation where each individual's marginal valuation is hypothesized to be low. Low marginal valuations aggregated over many individuals, when added to the valuation of non-hunters, could be quite significant. It is necessary when attempting to determine the marginal valuation or demand schedule for a wildlife species to separate these appropriable and non-appropriable good components. Failure to do so results in an inaccurate formulation of the demand schedule because of the different procedures involved in determining appropriable and non-appropriable good aggregated valuations.

Cocheba and Langford attempted to derive a demand curve for waterfowl, considering both the appropriable and non-appropriable valuations of the hunting experience, by modifying the Hammack and Brown model to incorporate variables for success and non-success in hunting. The purpose of the original Hammack and Brown model was to determine the marginal valuation of the waterfowl resource by an individual consumer, then to aggregate these valuations to determine the social value of the resource. The method employed to accomplish this was to impute the value from a recreational experience involving the resource, namely, hunting. What the model actually did, however, was to determine only the appropri-

riable value of the waterfowl resource.²³

The Cocheba and Langford model, by including a success and non-success in hunting variable, introduces the collective good dimension (the value of the hunting experience regardless of whether the waterfowl is bagged or not) into the valuation to obtain a closer approximation of the true value of waterfowl.²⁴ What the model also does is introduce the concept of indivisibility in consumption. Both of the above models, however, do not evaluate the non-consumptive valuation which exists completely separate of the hunting experience. Consequently, the value derived will underestimate the true value society places upon the resource. Cocheba and Langford's effort is noteworthy because it is one of the few attempts to simultaneously approach the problem of jointness of supply and multiple use in demand.²⁵ It also draws attention to the difficulties involved, and the actual failure, of accurately attaching a value to a resource of this nature.

The accurate derivation of demand for the collective good component of waterfowl is, in practice, difficult because of the problems involved in obtaining from consumers their true valuations or preferences. An attempt to determine this valuation would be a costly and time consuming endeavor, as would the duty of collecting a user charge and regulating the use of the resource. For these reasons, the government has "assumed stewardship" of the resource, and restricts use only with regard to the

²³ J. Hammack and G. M. Brown Jr., Waterfowl and Wetlands: Towards a Bioeconomic Analysis (Baltimore: The John Hopkins University Press, 1974), pp. 17-23.

²⁴ Cocheba and Langford, op. cit., pp. 490-509.

²⁵ Ibid., pp. 490-504.

hunting component of demand.²⁶

Externalities in the consumption of waterfowl have been discussed previously with regard to the effects of one individual's consumption interfering with the consumption of another individual (consumptive use of waterfowl). Externalities may also exist in production when the marginal private costs (input costs) of producing a good do not equal the marginal social costs (input plus external costs). External costs are involved which are defined as the costs of producing a good above the actual input costs. These costs, because they are not realized by the producer, will not be reflected in the pricing mechanism. The consumer will pay a price up to the marginal cost of production, while the external costs fall upon members of society (third parties) who may or may not desire to consume the final product. The production process, by not internalizing all its costs, creates a divergence between the marginal cost to the firm and the marginal cost to society. This is illustrated graphically on Figure 3 below.²⁷ The private firm will produce quantity Q_1 and charge price P_1 , while the economically efficient production level would be at quantity Q_2 with price P_2 . The quantity the firm produces is greater than the social optimum by $Q_1 - Q_2$, while the price charged is lower than the social optimum by $P_2 - P_1$. Input resources are being utilized when efficiency would dictate that they be used in the production of some other good.

²⁶ J. Krutilla and A. C. Fisher, The Economics of Natural Environments: Studies in the Valuation of Commodity and Amenity Resources (Baltimore: The John Hopkins University Press, 1975), p. 21.

²⁷ Aside: The marginal valuation or demand curve is the aggregation of the demand for the appropriable use of waterfowl and the non-appropriable use of waterfowl.

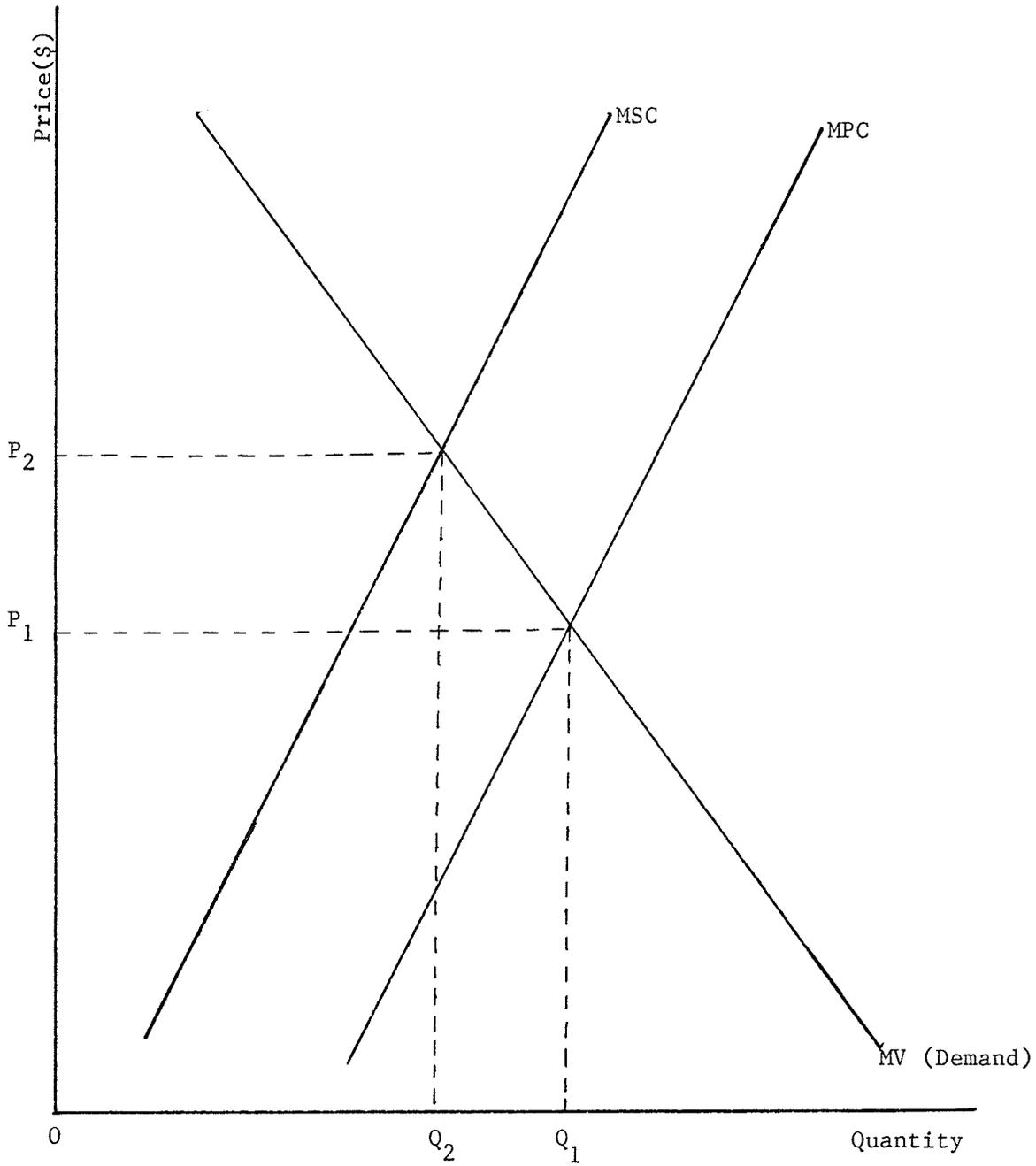


Figure 3

Divergence Between the Private and Social Cost
of Producing Waterfowl with Negative Externalities

Waterfowl preservation policies carried out by government groups have these types of externalities associated with them. Production of waterfowl has certain direct input costs associated with it. These would include the cost of habitat development and maintenance, and the cost of establishing and enforcing regulations regarding waterfowl use. There are also external costs involved for third parties in the production of waterfowl which take the form of financial losses to agricultural producers due to grain damage. The loss in the value of grain produced is an opportunity cost to society as well, because the resources used as inputs into production will be wasted if the benefits derived from the waterfowl produced do not outweigh these additional costs. These costs should be incorporated into the marginal cost function as a component part of the costs associated with preservation policies.

The scope of the externality problem extends into the international scene. As waterfowl transcend national and international boundaries so do the economies (values to hunters and naturalists) and diseconomies (the financial losses to agricultural producers) associated with their production. This constitutes a situation where the government policy of preserving waterfowl has distributional effects beyond the scope of its own national boundaries.

The distributional effects (the effect upon the utility of the individuals involved) of the preservation policy will be to adversely affect the utility level of the agricultural producer and, at the same time, increase the utility level of the naturalist and hunter populations. The policy may move society closer to an optimum solution for waterfowl production, given that the gains accruing to the naturalists are greater

than the losses to the producers, but, at the same time, it moves society into an area where one group's increased utility is at the expense of others. Little declared that "an optimum solution which corresponds to a bad distribution of income, may well be worse than a "sub-optimum" position corresponding to a good distribution of income."²⁸

If society wished to determine the optimal allocation of resources into the production of waterfowl, it would be necessary to equate the marginal cost of waterfowl production with the aggregated marginal valuations of all individuals involved in the consumption of the resource. The marginal cost (MC) curve could be derived by summing all the costs associated with the preservation and regulation of the waterfowl resource. The marginal valuations of each individual consumer can theoretically be derived from the utility function of that individual. Every individual will have a different valuation for each use of the resource, consumptive and non-consumptive. Each non-consumptive use will also have a different valuation attached to it. The non-consumptive valuations must be aggregated vertically for each individual and for all individuals. The consumptive valuations must be aggregated horizontally for all individuals. The socially optimal output of the resource which society will produce, given that the above valuations and costs can be determined and aggregated, is shown on Figure 4 at quantity M.²⁹ Society could then charge a price for the resource which would reflect the costs and values associated with it. This does not occur,

²⁸ I. M. D. Little, A Critique of Welfare Economics (Oxford: Clarendon Press, 1950), p. 84.

²⁹ John A. Due and A. F. Freidlaender, Government Finance: Economics of the Public Sector (Homewood: Richard D. Irwin Inc., 1954), p. 34.

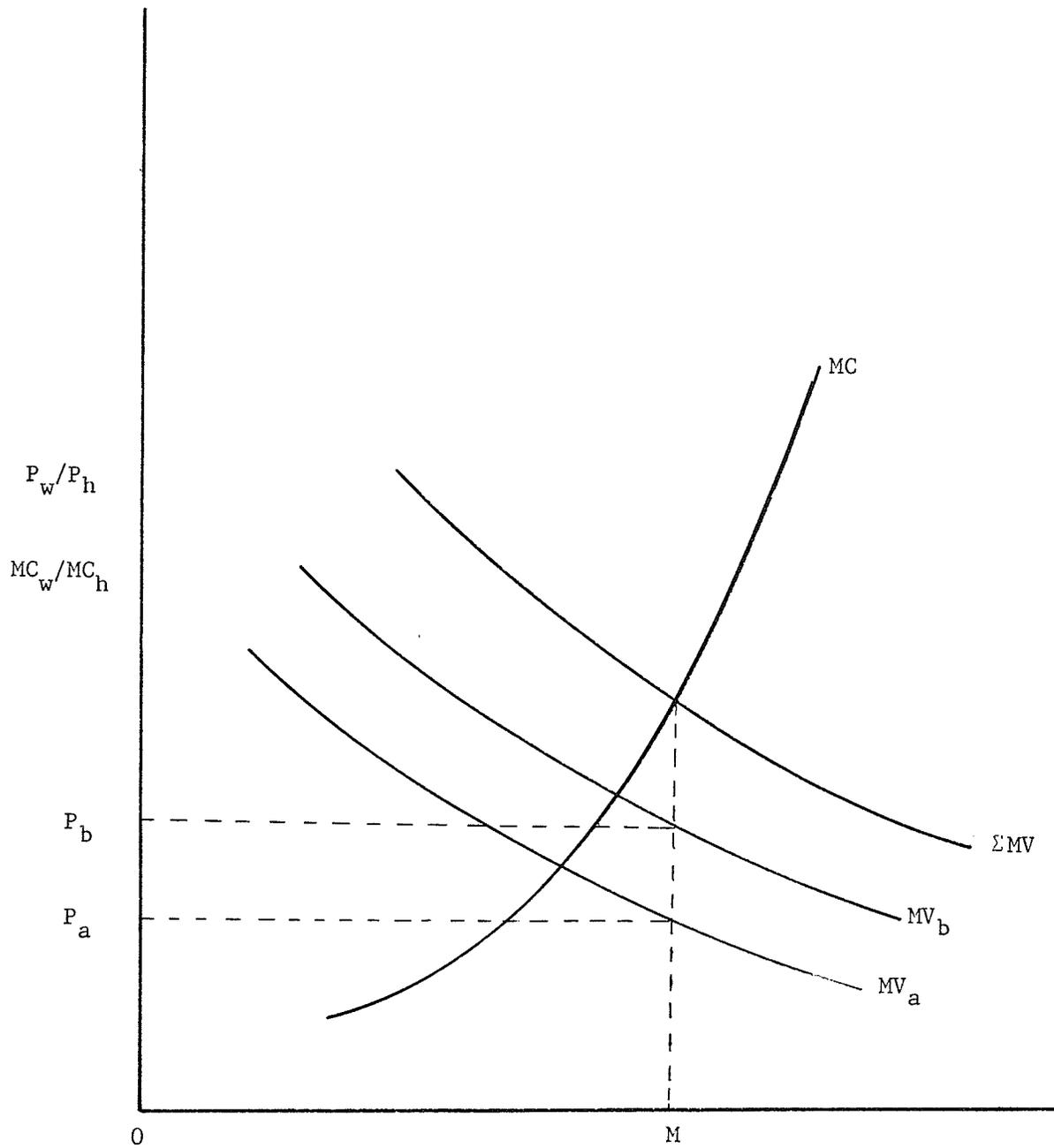


Figure 4

Optimal Output Can be Determined by Equating
Marginal Cost with the Sum of the Individual
Marginal Valuation Curves

however, because of the market failure components involved with the migratory waterfowl resource. These market failure components have been referred to throughout this section and consist of:

1. a lack of property rights for the resource which makes a pricing mechanism difficult to structure,
2. an indivisibility in consumption between consumptive and non-consumptive use which makes an appropriate user fee difficult to determine and administer among users;
3. an inability to regulate the non-consumptive use of the resource which makes it difficult to administer a price; and,
4. a failure to internalize the external costs involved in waterfowl preservation which distorts the true social cost of waterfowl production.

These market failures result in a breakdown of the market's ability to efficiently allocate resources into the production of waterfowl, and to produce at a social optimum. In order for a social optimum level of output to occur, an appropriate choice of government policy must occur. The only other possible means by which an optimum could occur is by a chance occurrence.

In order to maintain the optimum level of waterfowl production and still maintain an equitable distribution of costs, the present compensation scheme was developed. Compensation can have broader effects than merely promoting equity. The structure of compensation has the ability to alter the practices of agricultural producers in such a way as to promote inefficiency. In effect, what can occur is the situation where an efficient production of waterfowl will result in inequities in the

distribution of costs. Compensation is implemented to correct the inequities but it has the effect of promoting inefficiencies in the behavioural patterns of those individuals receiving the compensation. The following section explains the relationship between efficiency and equity, then goes on to explain the effect of compensation for equity upon the efficiency motivation of agricultural producers.

3.3 THE THEORY OF COMPENSATION

Compensation tests are defined as objective tests of economic allocative efficiency, whereby a policy is determined to be potentially superior if "the gainers" can hypothetically compensate "the losers" and still be in a better position than prior to the change. Conversely, it could also be said that society is better off when "the losers" are not capable of bribing "the gainers" to return to the initial situation prior to the policy change, and still be better off than if the policy were implemented.³⁰ From an efficiency perspective, it is sufficient that compensation could be paid, however, from a distributional perspective, the compensation becomes a necessity. Compensation, when dispersed correctly, can provide the bridge between equity and efficiency.

The compensation tests of Hicks-Kaldor and Scitovsky deal solely with the "potential superiority" of a policy change. Little develops the concept further and attempts to establish the "actual superiority" by introducing an ethical prescription involving the distributional effects. The "actual superiority" of a policy change is decided, based upon the answer to the question proposed by Little, as to whether the

³⁰ E. J. Mishan, Welfare Economics: Ten Introductory Essays (New York: Random House, 1964), p. 41.

distributional effects are desirable. The answer to this question is dependent upon the objectives of the policy, which in turn are dependent upon the value judgements or ethical norms established by those in positions of authority who represent the interests of society. Society may decide that a policy that redistributes income from the wealthy to the poor is desirable, or that a policy which increases the benefits proportionally to each group is desirable. If the original objective of the policy was not to effect the distribution of income but to meet other objectives (efficiency), society will sanction the payment of compensation to re-alter the income effects to achieve a more equitable distribution. Efficiency (increased net benefits to society) and equity (fair distribution of costs and benefits) are not synonymous and society must make welfare judgements regarding the desired trade-off between the two. If it wishes to achieve efficiency in production without adversely affecting equity, compensation is frequently the method employed to achieve an acceptable trade-off between the two concepts.

The Government of Canada has implemented a policy to preserve, protect, and regulate the use of migratory waterfowl for the benefit of present and future generations. If the benefits derived by society from the migratory waterfowl resource outweigh the costs associated with preservation, then the welfare of society (according to the Hicks-Kaldor criteria) has been increased.

There are adverse distributional effects associated with the preservation policy because of the external costs created for third parties. These costs take the form of financial losses to agricultural producers from grain damaged by waterfowl in areas where preservation activities

are carried out. The decision to implement a compensation scheme was based upon the value judgement (Little's bad distribution concept) that the distribution of costs required to achieve the increased benefits of waterfowl preservation to society was not equitable. The payment of compensation re-alter the income effects so that those who receive the benefits (society) from the policy also pay the total cost (including crop losses) associated with obtaining those benefits.

The following section discusses the effects of applied compensation schemes upon the efficiency motivations of agricultural producers in their production processes. Depending upon the degree and form that compensation takes, the efficiency of resource allocation into the production process can be affected. It becomes equally important to view the effect of a policy with an equity objective upon efficiency as to view the effect of efficiency upon equity; "to clarify the question of whether the payment of compensation to the victims of an external diseconomy effects the achievement of allocative efficiency."³¹

3.4 APPLIED COMPENSATION

Of the compensation schemes relevant to the problem of migratory waterfowl inflicted crop damage, two have been evaluated closely by

³¹ Sally Holterman, "Alternative Tax Systems to Correct for Externalities And the Efficiency of Paying Compensation," Economica 43(February, 1977), p. 1.

Stier³² and Browning³³ with regard to their effects upon the allocation of resources into production. The two compensation schemes are gross and net value compensation. Gross value compensation refers to compensation based upon the total value of the grain produced in the absence of waterfowl damage less the value of the grain produced in the presence of waterfowl damage. This value is a measure of the grain that is actually destroyed by migratory waterfowl (standing value). Net value compensation refers to compensation based upon the net value of the crop produced (value of production minus costs of production) in the absence of waterfowl damage less the net value of the crop produced in the presence of waterfowl damage. This value is a measure of the value of the grain that is actually destroyed, as in the previous case, plus the costs of production which are associated with waterfowl crop damage prevention. The remainder of the production costs (planting and harvesting) are assumed to cancel between situations because they will remain constant regardless of whether the waterfowl are present or not. Stier has made the assumption that damage will not equal the total value of the grain within the field and that harvesting will proceed in the same manner as if damage had not occurred. The major difference between a net and gross value compensation scheme is that a net value compensation scheme reimburses a producer for a portion of prevention costs whereas gross value compensation does not. The marginal cost of production to

32 Jeffrey Stier, "The Economics of a Dual Externality: Agriculture and Canada Geese in Wisconsin" (PhD. dissertation, University of Wisconsin, 1978), pp. 81-115.

33 E. K. Browning, "External Diseconomies, Compensation, and the Measure of Damage," Southern Economic Journal 43(January, 1977), pp. 1279-1287.

the producer per unit of gross output is independent of the amount of damage, while the marginal cost per unit of net output increases as damage increases because of the inclusion of prevention costs.

Stier takes the above theory and applies it to an actual situation occurring in the Horicon Marsh area of Wisconsin, where Canada geese are posing a problem in the form of damage to agricultural crops. The state has undertaken two programs, a prevention and a compensation program, designed to reduce the financial impact on agricultural producers of waterfowl crop damage. In a theoretical analysis, Stier attempts to evaluate the effects of gross and net value compensation upon the production practices of producers. In an overall attempt to evaluate the efficiency of the two alternate schemes, he attempts to evaluate the effects of the prevention program upon the level of compensation that would be required under both compensation schemes. His study is of interest because it is directly analogous to the situation prevailing within Manitoba and has implications regarding the efficiency of the existing and proposed compensation and prevention schemes for that area.

Stier concluded from his study that a gross value compensation scheme will have an adverse effect upon the extent of preventive measures undertaken, in that it will reduce the producer's marginal valuation of these measures relative to the compensation received for crop damage. The producer's marginal valuation of prevention measures declines because the compensation received for damaged grain replaces the losses that could have been prevented by undertaking such action. If the producer had the choice of undertaking prevention, and thereby reducing damage by a certain amount, or not taking action and receiving compensa-

tion for the same amount, the producer is more likely not to undertake the preventive action. The net effect is a decline in the use of prevention measures and a higher level of crop damage. Gross value compensation also does not affect the level of input resources utilized in producing a crop because the returns per unit of input will not be affected and, therefore, the total output from production will remain unchanged. This form of compensation scheme will result in producers reducing prevention measures while maintaining the same level of production. The end result is that the total amount of damage caused by migratory waterfowl will increase.

The effect of a net value compensation scheme upon the extent of preventive measures will have the reverse effect of a gross value compensation scheme. The cost of prevention will be returned to the producer in direct proportion to the rate of compensation, thereby increasing the producer's incentive to carry out these activities. The level of crop damage under net value compensation will be less than under gross value compensation.

Browning reviews, from a theoretical perspective, the effects of paying net and gross value compensation upon the efficient allocation of resources into the production process.³⁴ Browning concerns himself primarily with the effect an incorrect measure of damage, for which compensation is paid, will have upon efficient resource allocation. He explains this in the following manner. In the case of a producer's grain being damaged by an external force (cattle), the costs associated with producing the output are unaffected even though gross output is reduced.

³⁴ Ibid., pp. 1279-1287.

The cost of net output, i.e., the amount available for sale, is increased because the cost of production is spread over a smaller return. If compensation is paid for the total value of grain damaged (gross compensation), the total damage depends upon the quantity of grain produced. The producer will continue to produce the same quantity of grain, when in fact production should be reduced to account for the higher real costs involved. The additional real costs are the loss in grain produced due to migratory waterfowl damage. Browning declares that because net value compensation spreads the production costs over actual production (gross production less the loss due to migratory waterfowl), producers are more apt to reduce output to reflect the increase in real cost.

A compensation rate of one (100 percent the standing value of grain damaged) has been proposed for the Province of Manitoba which would, in effect be a gross value compensation scheme. This would imply a situation where funds are being allocated to producers as simple lump sum transfers, as their level would be dependent upon total output. The full value of actual crop damage would be covered thereby meeting the equity criteria, however, some degree of efficiency would be sacrificed because of a subsequent reduction in prevention action. This sacrifice would occur because the marginal cost of undertaking prevention measures would be greater than their marginal value and it would be non-profitable for a producer to initiate them. The level of damage no longer remains a decision factor in the allocation of resources to prevention because the producer is aware that between the compensation program and the market system, the full value of total output will be received. A

producer's harvesting incentive would be reduced because the marginal value per unit of grain harvested is no greater than the marginal value of grain compensated. The producer may leave the grain within the field for waterfowl to damage if there is a high probability (equal to one) that damage may occur. A compensation rate of one is a disincentive to producers to undertake preventive action to reduce the level of damage. These actions would traditionally have included such practices as planting less susceptible crops, altering harvesting procedures, and implementing scare tactics.

A compensation rate of greater than one (a compensation level of greater than 100 percent the value of grain damaged would reflect the additional costs and inconvenience that producers incur as a result of waterfowl damage) has been proposed by agricultural producers to ensure that the full value of all losses are accounted for. This again would constitute a simple transfer scheme as compensation would be based upon the value of total output. This level of compensation would have the beneficial component of giving the producer an incentive to tolerate higher levels of waterfowl in the the area and the presence of hunting upon his property.

In the above situation the marginal cost of undertaking preventive actions is greater than the marginal value of those measures, which in turn is less than zero. The marginal value is less than zero because the producer can receive a higher return through the compensation scheme on grain damaged than on grain sold in the market, if compensation is distributed at a rate greater than the full value of the grain. The cost of undertaking prevention action would decrease the revenue the

producer receives from crop damage. Attraction of waterfowl as opposed to dispersion becomes desirable, because a producer will receive a higher return through the compensation program than through the market system. There would exist a disincentive for the producer to harvest his grain.

A compensation rate of less than one may be less equitable to the producer but it would promote more efficient resource utilization. The marginal value of prevention would be greater than the marginal costs because the producer, by not receiving the full value of damaged grain, may have a higher return if damage was decreased and more grain was sold through the market. The increased returns are a result of increased prevention to reduce damage and, therefore, the marginal value of increased prevention could exceed the marginal cost if the increased returns were sufficiently high. The producer would have an additional incentive to gear his agronomic practices to reduce the potential damage because the value of the grain harvested will be greater than the value of the grain compensated. A producer would wish to harvest more and receive less compensation.

Theoretically, the most equitable level of compensation would equate compensation with the gross value of the loss which would, in turn, equal the gross value of the damaged grain assessed at the standing value. This would be determined by taking the market value and subtracting transportation, storage, and harvesting costs. However, the scheme is equitable only in the situation where the crop is to be sold in the open market. If the producer intended to use the grain within his own farming operation, the value of loss should equal the replacement value of

the grain and compensation should be based accordingly. The opportunity cost is greater for the producer utilizing grain produced within the farming operation for his own purposes than it is for the producer selling in the market system.

The above discussion regarding the effects of the compensation rate upon the efficiency of producers' agronomic practices illustrates that there is a necessity for a trade-off to occur between equity and efficiency. An equitable level of compensation may induce inefficient behaviour and, therefore, will not be sanctioned by policy innovators. The above theory consolidated by Stier and Browning surrounding the efficiency effects of gross and net value compensation, in combination with the efficiency effects promoted by alternate compensation rates, can be applied to the situation existing in Manitoba.

The compensation scheme presently existing within Manitoba operates upon the principle of gross value compensation. The producer receives compensation for the value of the crop destroyed (total value of crop prior to waterfowl damage less total value of crop after waterfowl damage). There is one modification in the compensation scheme in Manitoba which introduces the element of a compensation rate of less than one, in that there is a per acre maximum of 50 dollars which the producer can receive. A producer would not have the same incentive to reduce prevention activities as would exist with a gross value compensation scheme, because there is no guarantee that damage would remain below the maximum compensation available. Any damage in excess of 50 dollars per acre would be literally uncompensated and, if the producer wishes to maximize output and profit, there would be an inclination on his behalf to maintain prevention activities and allocate resources accordingly. In ef-

fect, the concept of a maximum per acre coverage would reduce the inefficiencies prevalent in a gross value compensation scheme.

The maximum per acre coverage has equity implications as well. These were discussed previously in Chapter II and basically concern the fact that producers of higher yielding or higher valued grain would receive a lower return on their cost of production through the Compensation Program than a marginal producer would receive. The 50 dollars per acre maximum would induce the above average producer to undertake a higher level of preventive action than it would the marginal producer.

In the Oak Hammock and Marshy Point areas of Manitoba, there is in effect a compensation scheme which reimburses producers for the total value of damaged grain. This scheme is gross value compensation with a compensation rate equal to one. The compensation scheme will promote inefficiency in the behaviour of the producer because it creates both a disincentive to undertake prevention and to harvest the grain. The reasoning for this was discussed above under the concept of a compensation rate equal to one.

Compensation in Manitoba is offered in conjunction with a government implemented program to prevent waterfowl damage. The combination of offering compensation and prevention free of charge can have reinforcing effects upon the disincentive motivations of agricultural producers. Compensation and prevention offered in this fashion would induce the producer to maximize output of grain produced because the producer would not perceive prevention costs and damage losses as real costs of production. There would be an incentive for the producer to alter farming practices to maximize output levels and, thereby, maximize damage lev-

els. Browning contends that the producer should restrict output to reflect costs associated with damage and prevention.³⁵ Gross value compensation should not be offered because it creates a failure for real costs to be reflected in the output decisions of producers. Net value compensation is, therefore, Brownings preferred option.

Compensation, if not properly designed and implemented, will move the economy away from efficiency in the allocation of resources. This occurs because compensation payments can affect the marginal cost and marginal value conditions associated with allocating resources into the production of agricultural crops. In so doing, it affects the profit maximizing behaviour of agricultural producers. The producer would operate in a manner which dictates that marginal revenues obtained from undertaking a certain action would outweigh, or at least equal, the marginal costs. This particularly refers to the decision of the producer as to whether or not crop damage prevention measures should be undertaken. If the marginal value of prevention is reduced, or alternately, the marginal cost is increased because the compensation scheme would yield a higher return on damage, then prevention measures would not be implemented. In addition, if the marginal value of compensation is greater than the marginal value of harvesting the grain, the producer may feel a greater inclination to leave the grain for the waterfowl to feed upon.

The objective of a compensation program is not to promote economic efficiency but to redistribute resources from one group to another based upon the value judgements of society as to what is considered just or fair. It is accepted practice that in certain situations some degree of

³⁵ Ibid., pp. 1279-1287.

economic efficiency must be sacrificed to achieve equity, while other situations may dictate the reverse. It is not until these objectives are clearly defined and enumerated that policy can be clearly formulated. It is partly because of unclear objectives regarding the trade-off between efficiency and equity that the Compensation Program controversy within Manitoba has been unable to be resolved.

One cannot assess the appropriateness of a particular policy, nor choose among alternative policies, unless one pays attention both to the probable consequences of those policies and the objectives that are sought.³⁶

3.5 CONCLUSIONS

The theory portion of this dissertation has attempted to outline the more relevant components of welfare theory that apply to the problem of migratory waterfowl inflicted crop damage. The major components of this theory center around: wildlife species as a common property resource which is non-renewable in nature; the effects of government intervention into wildlife management and the subsequent external effects created for third parties above the benefits derived by those individuals; the method of compensation which has been utilized to deal with these inequities; and, the effects of compensation upon the allocative efficiency of resources into the production process.

In determining a system of compensation that satisfies equity criteria and, at the same time, a system which minimizes the adverse effects upon the efficiency of producers, two systems were reviewed. The first was gross value compensation whereby compensation was based upon

³⁶ D. M. Winch, Analytical Welfare Economics (Middlesex: Penguin Books Ltd., 1971), p. 15.

the actual value of grain damaged. The second was net value compensation whereby compensation was based upon the actual value of grain damaged plus the difference in production costs with and without waterfowl damage occurring. It was concluded that net value compensation was the best option in terms of efficiency because the inclusion of the cost component meant that producers would be compensated for the cost of undertaking preventive action. The producer would be more apt to undertake such action in this case.

The following alternate compensation rates were analyzed; a rate greater than one whereby greater than the actual standing value is received for damaged grain, a rate equal to one whereby the actual standing value is received, and a rate less than one whereby less than the actual standing value is received. A rate greater than or equal to one has the most adverse effect upon allocative efficiency with regard to preventive action. The marginal value of undertaking such action is less than the marginal cost, whereas, the marginal cost associated with the receipt of compensation is less than the marginal value. A compensation rate of less than one would induce producers to undertake preventive action because the grain loss prevented which could be sold at market value would outweigh the return the producer would receive through the Compensation Program. The marginal value of undertaking the action outweighs the marginal cost. Equity is dependent upon the criteria established with respect to what is considered equitable, and this criteria may dictate that the compensation rate be equated to one. Efficiency, however, may dictate that the compensation rate be equated to a value less than one.

The question of objective has been raised at various points throughout the previous sections; whether it should be confined to equity, efficiency, or some combination of the two. Objectives are set by the government with reference to the "constitution" it upholds regarding the beliefs and desires of the individuals it represents.

It is impossible for economics to yield any policy recommendations without either knowledge of, or assumptions about, the welfare function,³⁷ and that function consists essentially of value judgements.

It is exceedingly difficult to separate applied welfare economics from the political process. Many decisions regarding policies designed to improve social welfare are not so much motivated by efficiency or equity considerations, but rather with the objective of re-election. In order to fully understand the policy options that are available for consideration to improve a welfare "problem situation" such as migratory waterfowl depredation, one must fully comprehend the political arena which is in operation. It is with this in mind that the following chapter was designed, to present the situation within a political, jurisdictional, and legal framework.

³⁷ Ibid., p. 29.

Chapter IV

JURISDICTIONAL AND LEGAL IMPLICATIONS OF MIGRATORY WATERFOWL LEGISLATION

4.1 INTRODUCTION

Interest developed in the constitutional and legal implications of migratory waterfowl inflicted externalities because of the following two elements. First, the results of the survey questionnaire indicated an antagonism on behalf of agricultural producers concerning the level of compensation being offered for waterfowl inflicted crop damage. The producers contended that because migratory waterfowl inflicted crop damage constitutes a protected hazard, compensation should be received for the full value of crop damage.³⁸ The producer was not concerned as to which level of government should bear the costs associated with compensation, so long as what was felt to be an equitable level was administered.

The second element consisted of the controversies existing between the federal and provincial governments surrounding the cost-sharing arrangement of the Compensation Program. A review of economic theory indicated that the compensation principle is based partly upon efficiency criteria and partly upon equity criteria. The equity criteria not only applies to the level of compensation the producer should receive, but

³⁸ Definition: Protected hazard is a term repeatedly used to describe the event of a government protected resource, such as migratory waterfowl, causing damage to grain crops, and thereby becoming a hazard to agricultural producers. The producer is unable to protect himself against this damage in any fashion harmful to the waterfowl.

also to the level of compensation each government level should contribute. These levels should be established based upon the distribution of responsibility which is determined by legislation passed by the governments involved.

The conflicting opinions regarding the Compensation Program's cost-sharing arrangements and the claim that an inequitable level of compensation was being administered, led to an analysis of the constitution with regard to the jurisdictional implications over a natural resource such as migratory waterfowl. The constitution, however, yielded no firm conclusion as to which level of government was jurisdictionally responsible for migratory waterfowl. In a further attempt to determine the distribution of responsibility for the crop damage problem between governments, relevant legislation from both levels of government was researched and the legal implications of each outlined. A search of case studies was also undertaken in an attempt to establish whether a precedent had been set in the past with regard to a similar situation, and to determine the constitutionality of certain controversial pieces of legislation.

The previous steps were taken to determine what provincial-federal cost-sharing arrangements would constitute an equitable settlement. The final step taken, given the findings of the analysis of legislation, was to determine the legal responsibility of the governments involved to compensate the agricultural producer for crop losses due to migratory waterfowl.

4.2 ANALYSIS OF LEGISLATION

The following two sections are designed to outline the legislation which has been developed regarding preservation activities towards migratory waterfowl. The first section outlines the federal legislation (BNA Act, Natural Resource Transfer Act, the Migratory Birds Convention Act, and the Canada Wildlife Act) and develops the jurisdictional implications for both the federal and provincial governments in terms of shared responsibility. The second section outlines the provincial legislation (Manitoba Wildlife Act) and develops the concept of provincial assumption of responsibility for migratory waterfowl.

4.2.1 Federal Legislation

The first piece of legislation reviewed was the Constitution of Canada (the British North America Act), which was passed in 1867 by the Parliament of Canada and is, by definition, "that body of rules establishing governments, and outlining what they can and cannot do."³⁹ The British North America Act (BNA Act) lays the ground work for the jurisdictional responsibilities accruing to the federal and provincial levels of government, and is used as the yardstick by which both federal and provincial legislation is determined to be ultra or intra vires. The BNA Act determines whether the level of government passing a particular piece of legislation has the constitutional authority to do so, or if they are infringing upon the jurisdiction of their legislative counterparts at the alternate governing level.

³⁹ Peter J. Meekinson (ed.), Canadian Federation: Myth or Reality (Toronto: Methuen, 1977), p. 41.

Specific reference to wildlife, and in particular to migratory waterfowl, could not be found under either Section 91 which lists specifically that category of responsibilities falling under the jurisdiction of the federal government, or under Section 92 which lists that category of responsibilities falling under the jurisdiction of the provincial government. However, under Section 92(5), reference is made to the fact that the province has the right to make laws exclusively for the management of its own public lands. The definition of lands, in constitutional terms, refers not only to the land itself but also to the air above it. Anything which occupies that land or air space belongs to the owner of the land for the duration of time it is there. This is frequently termed usufructuary ownership. An analogy can be drawn between migratory waterfowl and the fisheries as both are defined as transitory resources for which usufructuary ownership exists. The federal government officially has jurisdictional power over inland fisheries, however, under Section 92(13) of the BNA Act, the province is given the authority to prescribe any terms upon which provincially owned fisheries may be granted, based, or otherwise disposed of. In the case of Regina versus Robertson the conclusion was reached that

Provincial legislative power over its property carries with it the power of administration and control by the provincial executive. This means that the provincial government may without legislation, exercise in respect of its property, the same rights as a private owner.⁴⁰

Brought into the context of the migratory waterfowl situation, it can be concluded that the federal government has the power to legislate over the use of the migratory waterfowl resource. However, the province, un-

⁴⁰ G. LaForest, Natural Resources and Public Property Under the Canadian Constitution (Toronto: University of Toronto Press, 1969). p. 167.

der Section 92(5) of the BNA Act, also has the power to regulate the use of the resource while it is within the provincial boundaries. This is true as long as the regulations it formulates are not inconsistent with those established by the federal government. The federal government has the power to make rules regarding limitations on the use of migratory waterfowl, but the province has the power to legislate to further restrict use. They cannot, however, legislate to increase use without the co-operation of the federal government. Because the province can legislate in co-operation with the federal government, this poses a strong argument for the conclusion that migratory waterfowl is not the sole responsibility of the federal government, but is rather, a shared responsibility with the provinces.

A further argument to support this contention can be found under the law of property where the principle is established that:

Any person who tames or confines a wild animal so as to possess it is owner so long as he retains possession. He is said to acquire a qualified ownership per industriam. As soon as it escapes and resumes its wild character he ceases to own it, though he is allowed to retake it so long as he keeps it in sight and has the power and right to pursue it.

Mere temporary absences will not deprive a person of title to animals⁴¹ which are in the habit of leaving his land and returning.

Migratory waterfowl is considered to be the property of the province while within its boundaries or situated upon lands owned by the province.

⁴¹ F. N. Lawson, The Law of Property (Oxford: Clarendon Press, 1958), p. 57.

The onus of responsibility for migratory waterfowl, as inferred by the BNA Act, is shared between the federal and provincial governments. The provincial input into the management and control of the resource enters indirectly through Sections 92 and 109 of the BNA Act. These sections involve the provincial government in waterfowl management in two ways. First, the province is given the right to charge hunters a license fee for the privilege to hunt while within the boundaries of the province. The revenues raised through these fees adhere strictly to the province. Section 92 and 109 also succede to the province control over the crown lands situated therein, to manage for whatever purposes they feel yields the maximum social benefit. The province has the right to establish and manage wildlife preservation sites upon this property, but it is not obligated under any law or agreement to do so.

Section 109 of the original BNA Act refers only to the original provinces of Confederation; Canada, Nova Scotia, and New Brunswick. The same rights were not extended to the western provinces until 1929 with the negotiation and passage of the Natural Resource Transfer Acts (NRTA). Bird sanctuaries were explicitly outlined under Section 19 of the above Act:

to continue and preserve as such the bird sanctuaries and public shooting grounds which have already been established and will set aside such additional bird sanctuaries⁴² and public shooting grounds as may hereafter be established.

Bird sanctuary establishment and maintenance became the sole responsibility of the province within which they were to be situated. However, the NRTA does not make it mandatory for the province to establish addi-

⁴² Canada, Parliament, "The Manitoba Natural Resource Act." R.S.M., c. 180, s. 19, 1929.

tional sanctuaries and there is no obligation upon its behalf to do so.

The federal government retains responsibility for migratory waterfowl with the passage of the Migratory Birds Convention Act (MBCA) of 1916, which was passed for the purpose of protecting migratory birds within Canada and the United States. The MBCA was passed because migratory waterfowl, unlike other forms of wildlife, are not local in nature and their control and preservation cannot be restricted to a local region. Preservation efforts, within a province or country, would be completely futile if the species being preserved were shot and killed after crossing the provincial or national boundary. Migratory waterfowl, as a result, have been allocated a unique position within the classification of wildlife in Canada. The federal government, with the passage of this Act, has confirmed that the regulation of migratory waterfowl falls within its own jurisdictional powers, to ensure that the conservation efforts of any private, provincial, or federal agency are not in vain.

The MBCA designates the power to the Governor-in-General of Canada, under Section 4(1), to:

make such regulations as are deemed expedient to protect the migratory migratory game, migratory insectivorous, and migratory non-game birds that inhabit Canada during the whole or any part of the year.⁴³

The categories of regulation this involves include: closed seasons, bag limits; hunting seasons; hunting permits; export prohibitions; area restrictions; appointment of game officers; and, the definition of the game officers authority. The Migratory Bird Sanctuary Regulations (MBSR) outline the regulations governing the management of wildlife are-

⁴³ Canada, Parliament, "The Migratory Birds Convention Act." R.S.M., c. 1035, s. 4(1), 1916.

as. It should be reiterated that subsequent to the passage of the MBCA-MBSR in 1916, the NRTA of 1929 placed wildlife areas under the control of the province within which they were situated. The decision to establish and maintain such areas rests solely with the provincial government. Since the Province of Manitoba has neither federally established bird sanctuaries or wildlife areas situated within its boundaries, it has no responsibility towards maintaining habitat for migratory waterfowl.

The Canada Wildlife Act (CWA) of 1973 helps to emphasize the provinces' power with regard to land management by outlining the limitations placed upon the federal government's power pertaining to wildlife conservation and habitat management. This Act cedes authority to the Governor-in-Council of Canada to act on behalf of the federal government in: establishing committees and advisory bodies; organizing meetings to deal with conservation policies and programs; and, stimulating and organizing research efforts. These powers are limited, subject to Section 7(1) of the same Act:

Notwithstanding, the Minister may not conclude any agreement referred to, except with the approval of the province in which the program or measure to which the agreement relates is to be implemented, or the property to which the agreement relates is situated.⁴⁴

The federal government may implement policies dealing with wildlife but only if the government of the province to which the policy pertains is in complete accord. Once approval has been obtained, the Governor-in-Council has the power to make regulations, under Section 4(2c), in order to:

⁴⁴ Canada, Parliament, "The Canada Wildlife Act". R.S.M., c. 1609, s. 7(1), 1973.

Carry out measures for the conservation of wildlife on such lands not inconsistent with any law respecting wildlife in the province in which the lands are situated and subject to such regulations as the Governor-in-Council may make in that behalf.⁴⁵

The federal government may not so much as establish refuges for migratory waterfowl without provincial approval, even though it is technically responsible for preservation of those species of birds defined as migratory game, migratory insectivorous, and migratory non-game. The provincial authority appears to be paramount in this situation. It is worth noting, however, that restrictions such as this are self-imposed and do not have a constitutional basis. These restrictions could be removed through an act of Parliament, thereby giving the federal government complete freedom of action to do as it wished.

The preceding legislation indicates the existence of a non-definitive delineation of provincial and federal jurisdiction over the waterfowl preservation policy. The province has input in co-operation and consultation with the federal government and vice-versa. The province has the power to restrict the preservation policies of the federal government which require use of provincial lands, whereas the province must confine provincial use of the resource within the guidelines established by the federal government. The lack of a clear cut definition of responsibility under the preceding legislation supports the argument of migratory waterfowl as a shared responsibility.

⁴⁵ Ibid., s. 4(2c).

4.2.2 Provincial Legislation

The Province of Manitoba has a complementary act to the CWA which was originally passed in 1963 and entitled the Manitoba Wildlife Act (MWA). The original version was repealed in 1980 under sections 95 and 98 of Bill 103, with an alternate formula being proposed and accepted. The MWA outlines in detail the various powers or areas of authority assumed by the province with regard to wildlife. Migratory game birds are stated explicitly, under Schedule A, as falling under the jurisdiction of this Act. Sections 7(2) and 4(2c) of the Canada Wildlife Act are corroborated by Section 2 of the Manitoba Wildlife Act which establishes the power of the provincial government to designate crown lands as wildlife management areas for the preservation of wildlife species.⁴⁶ Section 3 states further that the province may make whatever restrictions, regarding the use of these designated areas, it deems necessary to preserve the areas for the purpose they were intended.⁴⁷

No activity, including wildlife preservation, can be carried out on provincial crown lands without the province's express permission, and the province is under no obligation to use the crown land for either

⁴⁶ Manitoba Wildlife Act of 1980, Section 2:

"For the better management, conservation, and enhancement of the wildlife resource of the province, the Lieutenant Governor-in-Council may by regulation designate areas of the province and prescribe a use or uses to which each area so designated shall be devoted."

⁴⁷ Manitoba Wildlife Act of 1980, Section 3:

"A regulation made under section 2 may, for the purpose of managing and enforcing the uses prescribed for each designated area, prescribe activities and things that are permitted or prohibited, as the case may be, within the area, and may prescribe restrictions, terms and conditions and other requirements that shall be observed by any person within the area."

wildlife management areas, bird sanctuaries, or refuges. The fact that areas such as Oak Hammock Marsh, Delta Marsh, Oak Lake Goose Refuge and Marshy Point Goose Refuge exist as refuges for migratory waterfowl rests entirely upon provincial discretion. The province in establishing these sites for the purpose cited in Section 2, has assumed responsibility for the administration and management of programs affecting wildlife, whether they be waterfowl, bear, or deer.

The MWA states, with proper exceptions noted, that all property rights, title, and interest in and to wildlife are vested in the Crown. It further states that the Crown is not liable for the actions of the property for which it has assumed such rights. The 1980 Manitoba Wildlife Act states this explicitly under Section 85(2).

no right of action lies and no right of compensation exists against the Crown for death,⁴⁸ personal injury or property damage caused by any wildlife.

Insertion of this clause into the Act insures that no private individual or organization can take legal action to force the province into contributing a greater amount than it willingly designates towards the prevention and compensation of damage caused by wildlife.

The Act also deals with the province's rights regarding licensing of individuals to hunt wildlife, including waterfowl, within the provincial boundaries. The province has the right to issue any permit, license, or certificate which is referenced in the Act or for which provisions are made in the regulations to the Act. Consequently, the province charges two fees; a Wildlife Certificate fee of \$2.25, and a Manitoba Game Bird License fee of \$4.00. Wildlife Certificate fees are placed into the -----

⁴⁸ Manitoba, Legislature, "The Wildlife Act." S.M., c. 94, s. 85(2), 1980.

"Wildlife Control Fund" and, at the present time, are used under Regulation 324/74 for "Payment of Compensation for Loss or Damage to Certain Agricultural Crops by Deer, Elk, Moose or Black Bear," and under Regulation 69/79 "Concerning Payment of Compensation for Loss or Damage to Certain Crops by Migratory Game Birds." The revised MWA does not commit the province to use the fund for this purpose, despite the fact that the Fund was originally established with this objective in mind.

The province receives a substantial source of revenue from the sale of licenses and from the expenditures of hunters while in the province. Viewed from a financial perspective, the province is not entirely devoid of interest when it comes to the preservation of migratory waterfowl.

The Government of Canada likewise receives financial benefits from the ownership of the natural resource. Because of its constitutional jurisdiction over migratory waterfowl, the federal government has the right to set fees for the use of the resource. This fee takes form through the Canada Migratory Game Bird Permit for which \$3.50 is charged.

The last area of interest with regard to the MWA concerns the regulatory powers of the province over the wildlife resources and the use made by individuals of the said resources. The categories of subjects within which the province has regulatory powers include: setting restrictions, prohibitions and qualifications for licensing and hunting; and, enforcement of the above regulations. The Act outlines areas where offences can occur, defines the extent of enforcement activities undertaken by the province, and bestows upon the province the authority to appoint game officers to insure that enforcement is carried out.

The jurisdiction over migratory waterfowl is concluded to be divided between federal and provincial governments, however, this is not relevant in a legal sense because it places no obligation upon either the province or Canada to implement any protection or preservation activities, or to bear any responsibility for the actions of migratory waterfowl.

4.3 LEGAL PRECEDENTS

A further area of contention relates to the constitutionality of two of the major pieces of legislation being scrutinized; the Migratory Birds Convention Act and the Natural Resource Transfer Act. In the event of a conflict of interest between the federal and provincial governments, which Act should take precedence if they are both declared *intra vires*?

In the Supreme Court of Canada case of Daniels versus Her Majesty the Queen, the contention was made that because of a clause in Section 13 of the NRTA, the MBCA was considered to be repealed by implication of the subsequent legislation.⁴⁹ The decision handed down by the Supreme Court of Canada took the position that repeal by implication is not favoured, and one act will supplant another only if they are incapable of standing together. The purpose of the NRTA was not to repeal the MBCA, but to place all provinces on equal footing with regard to their natural resources. There was considered to be no grounds for repeal and the provinces would still be required to adhere to the regulations set forth in the MBCA. The federal government retained a share of responsibility for

⁴⁹ Daniels vs. Her Majesty the Queen, (1968), S.C.R. 517 (SCC). p. 381.

the preservation and financial liability associated with migratory waterfowl.

The Northwest Territories Court of Appeal case of Regina versus Kupiyana involved the claim that the MBCA did not have the power to regulate with regard to the hunting of migratory birds because such regulations were seen as being beyond the constitutional authority of the federal government.⁵⁰ This would imply that the federal government had no jurisdiction over an individual's actions involving migratory waterfowl. The court ruled that the federal government, under the terms of the MBCA, had the power to make and enforce such regulations.

The result of the two court decisions was to place the federal government in a position whereby it could not excuse itself from the responsibility it assumed for the migratory waterfowl resource. Each Act, by being upheld by the courts, has the effect of upholding the federal government's jurisdictional responsibility toward migratory waterfowl.

4.4 THE LAW OF PRIVATE NUISANCE

The final topic for discussion is the legal aspects of the situation, particularly private nuisance and its relationship to migratory waterfowl crop depredation. Interest lies, more specifically, in the situation where waterfowl damage to agricultural crops has been increased within an area due to the creation of preservation sites and wildlife management areas.

⁵⁰ Regina vs. Kupiyana (1973), 36 D.L.R. (3d) 381 (N.W.T.C.A.) p. 381.

Private nuisance exists when the activities of an individual or organization impose actual or potential damage upon the property of surrounding individuals.

The defendant actively participates in producing a situation that is supposedly causing or likely to cause continuing detriment to the plaintiff ... an intuitive balancing by the judge of a number of circumstantial factors in the light of his view of prevailing social morality. No one element is necessarily decisive and, ostensibly at least, there is no absolute requirement of intention to harm or negligence.⁵¹

The establishment of wildlife management sites within an area, by governmental or private agencies, causes waterfowl to fly into an area such as Oak Hammock Marsh in increased numbers. Waterfowl tend to linger at these sites where a ready food supply is available, and where protection is offered against predators of both a human and animal variety. These birds stray into producers' fields in search of food, and in the feeding process, can cause extensive damage to the grain lying unharvested in swaths. The claim could be made that the establishment of wildlife preserves and management areas create adverse and harmful effects upon the enterprises of the surrounding landowners. The group responsible for these harmful affects should bear the tortious liability associated with their actions. In this situation the party at fault would be the provincial government.

The provincial government, through the Waterfowl Crop Damage Prevention Program, has undertaken measures to safeguard the property of surrounding individuals from hazards created by preservation measures undertaken upon crown lands. These actions to prevent damage are consistent with the Privy Council's decision handed down in the case of -----

⁵¹ A.M. Linden, Studies in Canadian Tort Law (Toronto: Osgoode Hall Law School of York University, 1968), p. 334.

Goldman versus Hargrave which states that those in occupation of land are responsible to:

safeguard their neighbours from hazards present on their land, not only where they arise by human agency, but also where they result from acts of God or natural causes.⁵²

This would imply that the owner of the property upon which a natural staging site occurs is responsible for damage caused by waterfowl to surrounding landowners' property during the period of time that the waterfowl is in residence upon the property. The laws or decisions handed down with regard to nuisance are quite variable as to what can and cannot be claimed, dependent upon the feelings of the judiciary presiding over the particular situation that is being viewed. A judiciary, in the situation stated previously, could take either of the following positions. Firstly, because the management area enticed migratory waterfowl to it, and this waterfowl in search of food caused physical damage resulting in financial loss and inconvenience to the neighbouring landowners, those responsible for the creation of the area should be accountable for the said financial losses. The second position that could be taken by the judiciary would relate to the concept of the general good to present and future generations caused by the establishment of the wildlife site. The benefits to society of establishing wildlife areas are high and, therefore, the agent for the areas could conceivably be excused for the adverse effects of his actions.

In the case of waterfowl crop depredation, this becomes a question of whether the depredation is an unreasonable intrusion upon the agricultural producer (traditional law of nuisance) versus whether the activity

⁵² Ibid., p. 337.

is a reasonable intrusion (modern law of nuisance).

In the situation where actions being carried out on the said property are for the public benefit, the individuals suffering can use an argument based upon the principle of equity. It is the normal procedure in such a case to rule in the following fashion.

Since it has been erected for the public benefit, then the cost should be defrayed by the total community served rather than placed on the shoulders of a few unfortunates who⁵³ are unlucky enough to dwell in the immediate neighbourhood.

Although this concept is the traditional standard with which most litigation processes are weighed and evaluated on a theoretical level, the following statement must be kept at the forefront of all discussion:

Although the action for private nuisance emphasizes by definition the injurious consequence rather than the conduct that caused it, in practice the courts examine and evaluate both factors... a weighing of the gravity of the harm alleged by the plaintiff and the utility of the conduct pursued by the defendant.⁵⁴

Liability occurs when land is utilized for non-natural purposes as opposed to natural. Non-natural purposes are defined as:

activities or artificially created conditions on land which by their nature or by circumstance inherently dangerous, in the sense that control is difficult or that if the operation gets out of hand the effect on the land of others is likely to be traumatic. A natural use of land, on the other hand, is any use of land, artificially contrived or otherwise, which does not in the circumstances involve⁵⁵ an enhanced risk of harm to the landed interests of others.

⁵³ Ibid., p. 342.

⁵⁴ Ibid., p. 346.

⁵⁵ Ibid., p. 364.

The decision as to whether wildlife management areas are natural or non-natural uses of the land lies with the court's decision regarding the extent of the risk being created by the activities for individuals within the area. If the establishment of waterfowl preservation sites increase the risk of crop damage by increasing the number of waterfowl present, this would constitute a non-natural use of the land. If on the other hand, waterfowl population levels were already high and crop damage extensive, the creation of waterfowl preservation sites would constitute a natural use of the land, because the risk of crop damage existed prior to the implementation of the preservation activities.

The argument against the provincial government, and other groups involved in preservation activities, is extremely persuasive in taking the stance that the provincial government, through non-natural use of land to preserve migratory waterfowl for the benefit of the general public, is guilty of creating a nuisance for surrounding land holders. Recompense for the liability imposed upon neighbouring individuals should be considered an obligation of those agencies creating the nuisance.

There is one major drawback to this argument and that is "legislative authority" whereby:

a statute ordains a particular operation which cannot be carried on without resulting damage or interference to others, liability cannot be visited on the actor, as long as he has taken all reasonable precautions to avoid the injurious effects.⁵⁶

The province cannot only claim that the necessary precautions to avoid crop damage were undertaken through the Prevention Program, but also that because the wildlife management area was created by an act of the

⁵⁶ Ibid., p. 371.

Legislature of Manitoba (Regulation 182/79 under the Wildlife Act), the province is exempt from taking responsibility for the tangible damage created by its policies under the power of "legislative authority". The province may have a moral responsibility to compensate individuals affected, but it has no legal obligation to do so. The availability of 100 percent compensation offered in areas surrounding Oak Hammock Marsh and Marshy Point is offered strictly through provincial goodwill, rather than through any obligation on the province's behalf.

4.5 SUMMARY AND CONCLUSIONS

The federal government under the BNA Act and MCA has assumed responsibility for migratory game birds. The BNA Act does not explicitly assign migratory waterfowl as a federal responsibility, but because it does not receive specific allocation into any category of subjects delegated to the provinces, it falls under the preamble of Section 91 and becomes the responsibility of the federal government. The MCA and Regulations outline the responsibility taken by the federal government with regard to migratory waterfowl. This responsibility entails the preservation, for the benefit of present and future generations, of those wildlife species which transcend national and international boundaries. Establishing preservation sites and regulating hunting activities are two methods by which the federal government implements its preservation policies.

The provinces are not exempt from all responsibility towards migratory waterfowl, even in the situation where the federal government offers protection and makes efforts to preserve these species. The provincial

government is involved through Section 92(5) of the BNA Act and through the NRTA. These Acts allocate to the provinces the right to manage their crown lands and natural resources without interference from outside forces, to the best interests of the province within which they are situated. If the province sees fit to utilize these lands for wildlife management areas, to aid the federal government in its bid to regulate and maintain migratory waterfowl populations, it does so entirely upon its own recognizance. Because such action is taken by the province of its own accord, the province should assume responsibility for the external effects associated with taking the action. The province, in establishing bird refuges and wildlife management areas, has found that the birds utilizing these areas are causing extensive damage to surrounding producers' crops. This is damage which the province has contributed to and for which it should assume responsibility.

The Manitoba Wildlife Act allows the province to have a major input into preservation activities regarding migratory waterfowl through its management of wildlife in general. The province can establish preservation areas; establish hunting regulations and enforce these regulations through the appointment of game officers; contribute one-half the funding for the crop damage prevention and compensation programs; administer all wildlife programs; and act in consultation with the federal government in establishing bag limits, length of seasons, and other federal regulations. The Canada Wildlife Act emphasizes the provinces contributions by drawing attention to the federal government's lack of authority to implement wildlife policies (particularly with regard to establishing preservation areas for migratory waterfowl) without provincial

approval. In addition, the concept of usufructuary ownership enforces the argument that the province shares in the responsibility for migratory waterfowl.

There are no conclusive answers that can be derived from the legislation as to the relative share of the costs that should be born by each level of government with regard to waterfowl crop damage compensation and prevention. However, both governments share the responsibility for the actions of waterfowl resulting from preservation activities. In the situation where there is constitutionally no exact delineation of responsibility, the courts may apply the rule of thumb that the responsibility be shared equally between the participating parties. If this legal precedent is followed for the costs involved in the crop depredation programs, the cost-sharing arrangement will not be changed from the one presently in existence. This would mean a continuation of the 50-50 cost-shared agreement.⁵⁷

The situation described above is analogous to the situation prevalent in private nuisance law. Where the degree of negligence cannot be practicably determined between the participating parties, then the participants will be assigned equal blame and the costs will be shared on an equal basis.⁵⁸ The same principle can be used for the situation of migratory waterfowl inflicted crop damage, where an exact delineation of responsibility is difficult to determine.

⁵⁷ Source: Consultation with Professor Dale Gibson, Faculty of Law, University of Manitoba. Expert on constitutional law.

⁵⁸ Manitoba, Legislature, "The Tortfeasors and Contributory Negligence Act of Manitoba." R.S.M., c. 266, s. 4(3), 1974.

From an economic perspective, there is no difference as to which level of government bears the greater portion of the costs. This decision is a part of the political process, which bases its decisions upon constitutions and acts of parliament or legislatures, which in turn are based upon value judgements of elected officials as to what constitutes the wants of society.

Chapter V
ANALYTICAL FRAMEWORK

5.1 INTRODUCTION

To this point the study has concentrated upon a description of: the problem existing with regard to waterfowl inflicted crop damage; the application of theoretical welfare economics to the problem; and a description of the political and legal framework which serves as a background to the problem. The following section entitled "Analytical Technique", reviews the alternative solutions which have been proposed, and analyzes the effect of these proposals upon the various groups involved; in part from an applied theoretical perspective on equity and efficiency, and in part from a cost perspective.

Previous studies undertaken for similar problem situations have centered around other aspects of the problem. These include such elements as the ecological factors affecting the level of crop damage,⁵⁹ the impact of the Prevention Program in Manitoba on the level of crop damage⁶⁰ and the trade-off of land use between agricultural and waterfowl

59 Renewable Resources Consulting Services Ltd., "A Preliminary Study of Waterfowl Damage to Commercial Grain Crops in Alberta," A Report prepared for the Fish and Wildlife Division of the Government of Alberta, Edmonton, 1969.

60 Ron Kabaluk, "Waterfowl Damage Control Program Review," Report prepared for the Department of Natural Resources, Winnipeg, 1976.

production.⁶¹

The Government of Saskatchewan undertook an evaluation of the total costs of waterfowl depredation upon agricultural producers using data obtained from an insurance program which was in effect in Saskatchewan prior to 1972.⁶² The value of the analysis is questionable because of the uncertainty surrounding the accuracy and validity of the data. Stephens contended:

Wildlife insurance indemnities provide a measure of the cost of damage, but are a minimum estimate because of a limitation on insurability and reluctance of some farmers to purchase insurance.⁶³

In addition, intangible costs are difficult to quantify for inclusion in this type of analysis. The result of non-inclusion is an estimation of costs biased in a downward direction. Intangible costs include the time spent in damage prevention activities, the costs of extra tillage and harvesting, and the opportunity costs associated with changed production

⁶¹ Lorne Colpitts, "The Cost and Feasibility of Wildlife Habitat Maintenance in the Minnedosa Pothole Country," Practicum, Natural Resource Institute, University of Manitoba, 1974.

and

Hedlin-Menzies and Associates, "A Proposed Economic Evaluation Procedure for Waterfowl Habitat in Canada," Unpublished report for the Canadian Wildlife Service, Edmonton, 1967.

⁶² Renewable Resources Consulting Services Ltd., "A Preliminary Study of Waterfowl Damage to Grain Crops in Saskatchewan," Unpublished report for the Canadian Wildlife Service, Edmonton, 1967.

and

Ross MacLennan, "A Study of Waterfowl Crop Depredation in Saskatchewan," Saskatchewan Department of Natural Resources, Wildlife Report #20, Regina, 1972.

⁶³ W. J. D. Stephens, "Migratory Waterfowl Damage in the Prairie Provinces," Canadian Wildlife Service Report, Saskatoon, 1965.

practices.

The analytical technique commonly used to evaluate the merits of programs such as preservation, prevention, and compensation is a form of cost-benefit analysis. This involves a comparison of the costs of undertaking a particular action with the benefits that can be derived from the action employing one of the following procedures; net present value, cost-benefit ratio, or the internal rate of return. When the benefits derived outweigh the costs, then the program meets the criterion of maximizing the value of social product. All of the above procedures involve the application of many vague concepts, such as the definition and quantification of tangible and intangible costs and benefits, shadow pricing of unpriced factors or factors which have been priced incongruously in the market, and the determination of the correct discount rate to apply.

Costs are much easier than benefits to quantify in the situation of a non-priced resource such as wildlife. Measurable cash outlays are involved in the establishment and maintenance of preservation sites, in the administration of the various programs, in the enforcement of regulations, in compensation of producers for damage incurred, and in the prevention of further damage. The intangible costs listed previously can either be ignored as being insignificant or treated through shadow pricing. Ignoring such costs results in an underestimation of the true costs to society and, therefore, an upwardly biased benefit-cost valuation.

Benefits are approached from a more abstract perspective because wildlife, except in the consumptive activity of hunting, is a non-priced

commodity. The individual's marginal valuation of the good is unknown and must be imputed from a hypothetical demand curve. Estimation of this demand curve can be accomplished using one of the several techniques available to determine consumers' willingness to pay to maintain the resource. Willingness to pay can be calculated using the direct approach of asking the consumer outright, or by using one of the indirect approaches of observing the consumers behaviour. Indirect methods include travel cost, hunter expenditure, recreation day, or some derivative of the above.

The direct interview approach has the drawback that individuals will frequently underestimate their willingness to pay because they fear it will result in a higher tax rate or user fee; or they will overestimate their willingness to pay if they believe it will result in greater quantities of the resource being supplied at no increase in cost. The indirect approaches also have several problems associated with them. They are unable to separate the individual's valuation of the wildlife species from his valuation of the activity involving the species, the natural setting, the entire recreation experience, or the reminiscences. This inseparability will result in an inaccurate estimation of the demand schedule for the wildlife species. As the area under the demand schedule is a measure of the benefits derived from the resource, comparison of this measure of benefits relative to the cost figure would result in poor policy evaluation.

5.2 ANALYTICAL TECHNIQUE

The traditional techniques of analysis are considered inappropriate for application to the problem being confronted regarding migratory waterfowl crop depredation. The traditional techniques are primarily benefit-cost studies associated with physical locations, consumptive activities, or entire recreational experiences. Crop damage is difficult to segregate into this type of framework because it is a subset or consequence of a completely separate activity, namely waterfowl preservation. A cost-benefit analysis of the value of preservation could be determined by comparing the benefits derived from waterfowl as a part or all of the recreational experience with the costs of establishing and maintaining the preservation area. The external costs of crop damage should be included as they are an opportunity cost to society resulting from the preservation of waterfowl.

This study, however, is not concerned with the relative benefits versus costs of waterfowl preservation. It is concerned with the externalities created for third parties by the preservation program, and the ability of the corrective program implemented to deal with the externality problem. The major conclusion previously reached is that the presently existing program does not adequately deal with the situation, particularly in regard to the equity question. It is proposed, therefore, that alternate policy options be reviewed to determine one option, or some combination of options, which would improve the situation.

The analytical technique employed to achieve the above is a simple policy analysis. Some of the factors which are considered are:

1. the implications of alternate coverage levels, both percent damage and maximum dollar per acre, which will be analyzed in terms of equity, actual physical costs to society, and efficiency in the agronomic practices of agricultural producers;
2. the methods of raising the necessary funds and to what extent each group involved bears the incidence of costs and receives a portion of the benefits;
3. the merits of increasing the extent of preventive measures in conjunction with and in opposition to the Compensation Program; and,
4. an analysis of the concept of a spot-loss insurance program for waterfowl inflicted crop damage.

5.2.1 Increased Compensation Levels (100%, 75%, Increase Acre Maximum)

The analysis which follows is concerned with evaluating the necessary increments to the governments financial contributions, if compensation is offered to cover the full value of crop damage. In order to do this, it is necessary to make the overall assumption that the level of crop damage is correctly known and that all other costs to producers associated with waterfowl preservation are negligible. The subsequent calculations for total costs can then be taken as correct and used as the basis for the compensation requirements. In order to evaluate the effects of increased compensation levels, the following assumptions are made.

Assumptions:

1. Producers are fully aware that compensation is available and when damage occurs will make claims accordingly. This assumption is justi-

fied by making reference to the widespread publicity that negotiations surrounding the program have received in recent years in many of the farm oriented newspapers (The Western Producer, Manitoba Co-operator). The work of government employees, agricultural representatives from the Manitoba Department of Agriculture, and game officers from the Department of Natural Resources, has increased producer awareness, particularly in areas where damage is recurring. Data pertaining to the first few years was dropped because, at that point in time, general knowledge regarding the program was limited.

2. Manitoba Crop Insurance Corporation adjustment figures, as they are the only recorded values available over the life of the program, are assumed to be correct regarding the amount of damage caused by waterfowl. It is also assumed that these estimates include trampled as well as consumed grain. Producer valuations in damage estimation will exhibit greater inaccuracies because they rely heavily upon memory and may be influenced in an upward direction by producer bias. Estimates by adjustors are claimed to be biased in the reverse direction but, as it is impossible to determine if this is true (and if true, the exact size of the bias), this data is presently the best available.

3. Price levels established within the Agreement are representative of market prices over time. The price level used by Manitoba Crop Insurance Corporation adjustors to estimate the value of crop damage is the level by which all crop insurance claims are evaluated. This price level is established below the market price to give producers an incentive to harvest the residual crop. Technically these price levels represent the standing value of the grain within the producer's field (mar-

ket value less harvesting, storage, and transportation costs). This price level has increased slightly each year in conjunction with crop insurance prices.

4. Costs incurred by producers in addition to crop damage but as a result of the presence of waterfowl (increased tillage and harvesting costs, additional labour costs, additional weed control costs, and prevention costs), are negligible. The largest percentage of producers within Manitoba will receive damage one out of every three years. The costs stated above for any given year are small relative to total costs of production for that year. When considered over time, these costs become even more miniscule. Where they do play an important role, however, is in areas where producers may incur damage every year, or severe damage in the odd year. Producers were unable to estimate quantitatively the magnitude of these costs and, therefore, no accurate estimates could be derived.

5. Prevention costs by producers are negligible as most scare equipment is provided free of charge by the Department of Natural Resources, and is maintained at government expense by officers appointed by the Department. The majority of producers cited the time spent in scaring activities as the most significant cost of prevention, however, they could not provide good estimates of the actual time involved. Given this uncertainty, it was considered the best policy to ignore prevention as a relevant cost. Any estimate made by the researcher would be subject to error due to a general lack of information.

Until this point, the present dissertation has attempted to determine whether the agricultural producer, suffering from waterfowl inflicted

crop damage, is justified in the receipt of compensation for the full value of the damage. The general premise upon which the subsequent analysis is based is that the producer is so entitled. This premise is justified in terms of the risk factor and the time that the risk commenced. In severe depredation areas (Oak Hammock, Oak Lake, Marshy Point, and The Pas) the risk of crop damage has increased substantially within the past ten years because of the actions of private and government sponsored conservation groups.⁶⁴ The majority of land within these areas was utilized for agricultural production prior to the commencement of these preservation activities. The producer has not voluntarily exposed himself to the risk, but has had the risk forced upon him. Consequently, the producer should receive full compensation on equity considerations.

A producer who purchases property within an area subsequent to the establishment of a preservation site does so fully cognizant of the fact that the risk of waterfowl depredation exists. This producer should not be treated in the same manner as a producer who purchased property prior to the commencement of the harmful effects. However, in the situation under analysis, the latter case is the most prevalent and, the simplification is made that the majority of producers within damage areas acquired the property prior to the commencement of risk. Increased compensation levels are, therefore, promoted once again on equity grounds.

⁶⁴ Source: Personal communication with individuals from the Manitoba Department of Natural Resources and producers within the aforementioned areas.

The argument has been put forth that the agricultural producer, with the purchase of property, does not have the right to impose externalities upon society by draining wetlands and thereby reducing waterfowl population levels. Consequently, the drainage of wetlands has come under regulation under Section 51(1) of The Water Rights Act which states with respect to drainage:

Notwithstanding anything in this Act or any other Act, no person shall construct any works without the written approval of the minister thereto.⁶⁵

The assignment of property rights, according to Coase, is an insignificant factor in the attainment of an optimal solution.⁶⁶ If the producer upon purchase of property is given the absolute authority to regulate the terms and conditions for use of that property, an optimum trade-off could occur for wetland management between the production of waterfowl and agricultural crops. Society would be willing to pay producers to maintain wetland and to suffer crop deprecations. Conversely, if society was assigned the property rights to the land and the producer rented the right to producer agricultural crops upon the property, then the producer would be willing to pay society for the right to drain wetlands in order to produce larger quantities of agricultural crops.

However, the rights attributable to the ownership of property can be overridden by government legislation or government action. The government, for example, has appropriated specific property rights from the producer through the The Water Rights Act and The Wildlife Act (to drain

⁶⁵ Manitoba, Legislature, "The Water Rights Act." R.S.M., c. 289, s.1, 1959.

⁶⁶ Ronald Coase, "The Problem of Social Cost," The Journal of Law and Economics October(1960), pp. 100-129.

wetlands and to harm waterfowl which are creating financial losses to the producer). The government implements the above action in order to provide society with a resource from which it derives substantial benefits. In so doing, the ability of the groups involved to arrive at an optimum solution through arbitration and negotiation is eliminated, because there is no absolute assignment of property rights. The government acts as a third party who attempts to reconcile the two major participants involved. The methods it assumes on behalf of society are illustrated above, whereas on behalf of the producer, these take the form of prevention and compensation.

In the situation under study, there is no legal or economic justification for the payment of compensation. The payment of compensation rests solely upon the judgement of society and its determination of what is fair and equitable with regard to the distribution of costs and benefits. It is the assumption being made hereafter that society would decree that it is unequitable for a minority of individuals to bear the costs of improving the welfare of the majority. The question is not one of liability or efficiency in allocation of resources, but rather, one of equitability.

5.2.2 One Hundred Percent Compensation

Initially, this section outlines the level of funding presently required for the Compensation Program under a 50 dollar per acre maximum coverage level. The effects upon the financial requirements of Canada resulting from an increase in the level of compensation to 100 percent of the value of crop damage, will be examined. The direct and indirect

effects of this action upon the different groups involved with waterfowl preservation and damage will also be examined.

Actual and compensated damage figures for the past six years for the Province of Manitoba are outlined in Table 2.5 of Chapter II. The maximum amount of damage claimed for any given year is 1.0 million dollars, with a six year average of approximately 600,000 dollars, and a compensated average of 280,000 dollars. One hundred percent compensation would imply, on average, an increase in compensation funding of 320,000 dollars per year. Under the present system, one-half of the required increments in funding would be contributed by the province and one-half by the federal government. The additional amount that each group would be required to contribute appears small at 160,000 dollars per year, however, it must be remembered that presently the fund consists of contributions per government of 225,000 dollars per year. What is in effect being asked for is an 70 percent increase in the magnitude of contributions made to the Compensation Program by each level of government.

The financial implications of 100 percent compensation are not limited to the Province of Manitoba. Canada contributes a maximum of 2.0 million dollars per year to the three prairie provinces. Assuming the ratios of actual to compensated damage for Alberta and Saskatchewan are roughly the same as for Manitoba (approximately 2 to 1), the required federal contributions would be doubled to 4.0 million dollars per year. Accurate data could be obtained from the provinces to verify or disprove the above assumption regarding these ratios but, as long as the implications are realized, it is not necessary for the purposes of this study.

Compensation levels of less than 100 percent would vary the level of funding required. For comparative purposes, Table 5.1 was constructed outlining the increase in compensation necessary to meet the added requirements for the Province of Manitoba, assuming average crop damage of 600,000 dollars per year.⁶⁷ If only the increment to cost is examined, whether the level is established at 40 percent or 50 percent of the value of crop damaged is insignificant. (A 10 percent increase in the level of coverage results in an increase in the financial contribution of 60,000 dollars.) Factors other than the actual financial outlay (politically or efficiency oriented) appear to be more significant in the determination of the compensation level. These factors will be discussed when analyzing the effects of 100 percent compensation levels upon the agricultural producer.

The next question is with regard to the effect of increased compensation levels upon the various groups involved. The effects on federal and provincial government departments have already been discussed. The only issue that could be added would be the effect of a change in the distribution of costs from the present 50-50 cost-shared arrangement. This change would be a political decision based upon the question of jurisdictional and moral responsibility. Furthermore, as stated in the previous chapter, in a situation where the distribution of responsibility cannot be accurately determined, the courts may apply the rule of

⁶⁷ Aside: If the actual Canadian Wheat Board final market price, or the Average Daily market price were used to calculate "actual damage", the values in Table 2.5 would be higher. The contributions required by the federal and provincial governments, as a result, would be significantly increased. However, compensation price levels are established below market value to represent the value of standing grain.

Table 5.1

Alternative Levels of Compensation and Their
Effect on Required Funding

Level of Compensation	Compensation Required for Manitoba (\$)	Compensation Required for Canada (\$)
100%	600,000	4,000,000
90%	540,000	3,600,000
80%	480,000	3,200,000
70%	420,000	2,800,000
60%	360,000	2,400,000
50%	300,000	2,000,000
40%	260,000	1,600,000

The figures for compensation required for Manitoba and for Canada were obtained by calculating the average actual damage over the past six years. The third column refers to the average actual damage for all three prairie provinces (Manitoba, Saskatchewan, and Alberta).

The assumption is made that an increase above the level of compensation already in existence will not induce producers not presently making claims to do so in future. At higher compensation levels this could occur and the 600,000 dollar average would underestimate the actual damage level. In addition, changes in the price level will affect the dollar value of actual damage occurring but this effect has been ignored for this table.

thumb that the costs be allocated between the participating parties on an equal basis (50-50 cost-shared). This could result in a decision being made which supports the present cost-shared arrangement.

The second group, agricultural producers, would receive the financial benefits of increased compensation. Any compensation level over 40 percent of actual damage would provide greater benefits for the producer than is received under the present system. Increased compensation levels, up to 100 percent, would satisfy the equity objective of reducing the financial impacts of preservation externalities upon this group.

It has been proposed that 100 percent compensation may induce inefficient agricultural practices by producers because they know that the full value of grain grown will be received regardless of the extent of damage. Producers in severe depredation areas may be more inclined to delay spring planting on fields that are subject to waterfowl crop damage, as opposed to planting early in the hopes that harvesting will be completed prior to the influx of waterfowl in the fall. In the fall, producers would have no incentive to harvest first those fields where the threat of damage is greatest, or to harvest damp and dry later those fields where potential damage exists. A 100 percent compensation program could prove to be a disincentive program to producers, as it would reduce the producers incentive to become risk averse and grow less susceptible crops, to continue prevention measures that may have been undertaken under a lower level of compensation, and even to harvest the grain. The producer will have no financial incentive to implement any of the above measures, as the returns on the grain will be the same whether it is sold through the market system or through the Compensation Program.

The efficiency effects of 100 percent compensation listed above are based upon certain assumptions regarding the structure and application of compensation. It assumes that the price by which damage is assessed is fairly representative of the market price (adjusted for harvest, storage, and transport costs). It also assumes that the adjustment procedure accounts for both consumed and trampled grain.

The disincentive effects could be removed from the Compensation Program by reducing the level of compensation, reducing the price used in damage assessment, or making receipt of compensation dependent upon the implementation of preventive actions.

Hunter and naturalist groups would be relatively unaffected, from a cost standpoint, if increased funding was appropriated from general tax revenues to pay for increased compensation. Each individual's contribution would be insignificant as the cost would be spread over large numbers. In addition, the number of waterfowl remaining available for use would not be affected, thereby not affecting the level of benefits received from the resource. The general public as a whole would bear the cost of increased compensation coverage with agricultural producers receiving the benefits.

5.2.3 Increase Acreage Maximum

An increase in the per acre coverage level from 25 to 50 dollars was implemented in 1978. The effect of this increase, and of further hypothesized increases, upon the total costs of compensation is examined in this section. Some of the issues requiring settlement in order that this system can function efficiently (the advantages and disadvantages

of this form of change relative to a percent damage coverage scheme) are raised. The hypothesized effects upon the various interest groups involved are also examined.

An alternative to raising the percent coverage to 100 percent would be to increase the maximum coverage per acre allowed above the 50 dollars presently allowed. Raising the limit would naturally imply increased costs to governments. For the sake of quantification, Table 5.2 was constructed to display the general trend and magnitude of the costs of increased compensation over time.

Table 5.2 illustrates that in order for a per acre maximum to cover the full value of damaged grain, the level should be established between 90 and 100 dollars. Although the methodology used to derive the figures in Table 5.2 may be questionable with regard to the assumption that every claim receives maximum coverage, the results are not affected. Table 2.5 of Chapter II supports these results because it indicates that the present 50 dollar maximum compensation per acre, over the life of the program, has accounted for approximately one-half the value of grain destroyed. The compensation level would need to be doubled to 100 dollars to account for the remaining one-half of damage which is presently uncompensated.

A compensation program based upon a per acre maximum coverage level will be inequitable for the producer growing higher yielding or higher valued crops. Under the present per acre maximum system, if two producers grow wheat valued at 100 and 70 dollars per acre respectively, and both producers receive 100 percent waterfowl damage, then both producers will receive 50 dollars payment through the Compensation Program. The

Table 5.2

Alternative Levels of Maximum Coverage Relative to Actual Damage'

Year Damage''	Compensation Levels (maximum \$/acre)						
	\$25	\$50	\$70	\$80	\$90	\$100	
1975	735,576	315,600	631,200	883,680	1,009,920	1,136,160	1,262,400
1976	--	--	--	--	--	--	--
1977	841,461	219,952	439,905	615,847	703,847	791,828	879,809
1978	696,181	--	364,963	510,948	583,941	656,934	729,927
1979	535,327	--	274,405	384,167	439,048	493,929	548,810
Av.	561,209	178,517	357,035	499,849	571,256	642,663	714,070

'This analysis assumed for simplicity, that every claim received maximum coverage. For example, in 1975, to determine the total acres damaged: Compensation paid was divided by maximum coverage to obtain acreage. Once acreage was determined, it was multiplied by the increased coverage level to determine the effect on total compensation payments. ($315,600/25 = 12,624$ acres: $12,624 * 50 = \$631,200$) The assumption is made that the increased coverage level will not induce producers previously not making claims to do so now.

Note: The above figures are not the actual amount that would be paid in compensation. The actual amount would be less because the value of production destroyed will frequently fall below the higher maximum coverage levels.

''Values exclude the 100% compensation areas of Oak Hammock Marsh and Marshy Point. It was believed that these areas would distort the effect of increasing the per acre maximum for the remainder of the province if they were included.

first producer incurs an opportunity cost of 50 dollars while the second producer incurs an opportunity cost of only 20 dollars. The first producer may have required a higher level of input into the production of the higher yielding wheat crop, in which case a smaller proportion of production costs are being compensated. In areas where severe depredation frequently occurs, the net effect of per acre maximum coverage may be to reduce the producer's incentive to allocate input resources efficiently into the production process. If it is decided to adopt a per acre maximum coverage system, it should not be geared towards full value compensation, as percentage compensation would be more efficient in meeting that objective. A percentage based program does not discriminate against producers growing higher yielding or higher valued crops in the manner that a maximum coverage level per acre would. The per acre maximum program would be best applied where the objective is to cover the costs of production.

In covering the costs of production (cost compensation), the decision would have to be made as to whether compensation would apply only to variable costs or to variable plus fixed costs.⁶⁸ The present program is based upon the premise of covering variable costs only, as fixed costs are and not considered a part of the yearly costs associated with grow-

⁶⁸ Definition: Variable costs are defined as costs which fluctuate directly with the level of output. They are generally related to the price of input factors such as: fuel, repairs, fertilizer, chemicals, seed treatment and cleaning, twine, labor, custom charges, interest on operating capital, and equipment rental.

Definition: Fixed costs are defined as costs which do not fluctuate with variations in the level of output. These include: rent, taxes, machinery insurance, investment in land, investment in buildings, investment in machinery, machinery depreciation, and miscellaneous overhead.

ing a crop. This ignores the fact that producers operate on the premise that the production of agricultural goods will supply sufficient revenue to cover the initial capital investment costs. These costs are spread over the life of the operation but, if they are not covered for a given year, they must be carried forward to another year, making the financial requirements heavier at that time.

Basing the compensation maximum coverage levels on total costs (fixed plus variable) has one major difficulty. In the situations where a more efficient producer, a producer with above average land, or a producer in an area with a favourable growing season grows an above average crop, the producer is penalized in the sense that compensation can only be received to cover the costs of production. The producer would have no incentive to maximize output (efficiency in production) if this process continually recurs.

The total cost per acre and gross revenue per acre figures averaged over the crops of wheat, barley, and oats, on a per acre basis, are outlined in Table 5.3. These figures are taken from the Cost of Production Study and indicate that, on average, the costs to a producer of growing an acre of grain will be greater than the returns received on that acre of grain.⁶⁹ For this reason, these figures could not be used as a basis for the compensation level. It is very important that the figures chosen as a basis for compensation levels are accurate and equitable. It could prove to be a substantial problem to determine a value which would satisfy all groups involved. Referring again to Table 5.3, it can be seen that maximum compensation coverage levels, if based upon total

⁶⁹ Framingham and Associates, op. cit.

Table 5.3

Cost of Production Study Estimates of Yields, Costs and Revenues
Associated with Growing Wheat, Barley, and Oats in the
Northwest, Interlake, and Manitoba as a Whole'

	Area		
	Interlake''	Northwest'''	Manitoba
<u>Yield (bu./acre)</u>			
1. Wheat	26.10	21.38	26.32
2. Barley	51.50	41.75	45.00
3. Oats	--	20.00	60.49
<u>Total Cost (\$/acre)</u>			
1. Wheat	159.82	120.79	129.18
2. Barley	154.35	127.96	138.26
3. Oats	--	136.66	118.76
<u>Total Gross Revenue (\$/acre)</u>			
1. Wheat	116.92	95.58	120.13
2. Barley	126.68	110.58	114.29
3. Oats	--	46.77	90.27
<u>Returns to Investment (\$/acre)</u>			
1. Wheat	21.02	25.39	46.44
2. Barley	53.04	51.87	46.62
3. Oats	--	15.85	33.37

--No data was available from the Cost of Production Study for the crop of oats in the Interlake Region of Manitoba.

'Figures available are averages for the entire region under consideration, and therefore, are more extensive than the areas receiving waterfowl damage to crops.

''The Interlake includes both Area I (Bifrost-Fisher Branch) and Area II (Rockwood-St. Andrews) of the previous analysis.

'''The Northwest includes Area III (Minto, Strathclair, Harrison, Rossburn, Shoal Lake, and Silver Creek) of the previous analysis.

production cost, would average 130 dollars per acre whereas, if based upon total revenue that could be raised, would average 110 dollars per acre. This last value supports the figure determined in the previous calculation of approximately 100 dollars per acre.

Another difficulty with the above two figures, as a basis for compensation rates, is that they are averages for the three crops. The producer receiving compensation for oats will receive a higher return on costs and foregone revenues than the producer receiving compensation for wheat and barley. The program would promote inequities against producers of higher valued grain types. In addition, a producer situated within an area of high fertility soils require lower input costs. Under a cost compensation scheme, this producer would receive a higher return than a producer situated in an area of low fertility soils. To maintain equity a cost of production figure would be required for every crop suffering damage for every region of Manitoba.

There are basically two forms of compensation; cost compensation and value compensation. The incentive and equity implications of value compensation have been discussed in the previous section, and those for cost compensation have been inferred above. Value compensation will induce producers to maximize the total output of grain grown at the minimum cost possible, as long as they will receive 100 percent damage compensation. The net outcome, in the event that damage does not occur, is an increase in total output. In the event that damage does occur, increased total output also implies increased total damage. The level of damage may also be worsened because producers have no incentive to implement preventive measures.

Cost compensation, if established at a set rate, will induce producers in severe depredation areas to minimize costs with no incentive to maximize output. Producers will not feel inclined to put more into the production of a crop than they will receive in return. As stated previously under the discussion of gross and net value compensation, any compensation scheme which affects the revenue and cost conditions at the margin, will affect the producer's decisions regarding profit maximizing behaviour. This will in turn effect the efficient allocation of resources into the production process.

The effects on interest groups other than agricultural producers will be similar to the 100 percent compensation option. Government may not be required to contribute as much funding under this system (dependent upon the maximum established), but the difference would be insignificant. The naturalists and hunters would once again feel no effects because there would be no noticeable increment to their costs, and no reduction in the quantity of waterfowl supplied.

5.2.4 Standardize Adjustment Procedure

The following section concerns one of the major areas of producer dissatisfaction regarding the Compensation Program, the adjustment procedure. This section is concerned with the justification of this dissatisfaction and its relevance with regard to the administration of the program.

In the survey conducted (appendix A), 38 percent of producers questioned felt that the adjustment procedure underestimated the value of grains destroyed. The major complaint concerned the Manitoba Crop In-

insurance Corporation adjustors' failure to include trampled grain in the estimates of damages. In the literature previously cited, quantity of trampled grain is claimed to be as high as eight times the quantity of grain consumed. Failure to include trampled grain would result in a gross underestimation of actual damage.

The estimation of damage is calculated by taking 10 stalks of grain, counting the damaged heads, and converting this to a percentage figure. This is repeated at several locations and the average is taken as the official percent damage for the field. The producer claims that in taking the initial sample, grain imbedded into the ground is not included as it cannot be easily picked up. If the claim made by producers is correct and trampled grain is not included in the adjustment procedure, then a problem exists. If the contention is not true, it should be stressed by the adjustor at the time of damage assessment that the trampled grain is in fact being included. If some producers are adjusted for trampled grain while others are not (based upon the adjustor's discretion), then the procedure should be standardized so that all producers are treated equally. This is important from an administrative perspective because inequities that are thought to occur in the application of a program are reflected in the acceptance of the program at the farm level.

The second reason cited for dissatisfaction with the adjustment procedure was with regard to unfair estimates of yield (bushels/acre). This was especially true when a crop was destroyed beyond the point where a yield estimate could be determined. The yield of a similar crop grown by the same producer is used by adjustors as a proxy for the yield

of the crop destroyed. Producers feel that these yield estimates are frequently below those of the field destroyed, however, no comment was made upon the possibility of the estimated yields being greater than those of the field destroyed.

The position taken by the Manitoba Crop Insurance Corporation concerning the adjustment procedure must also be represented. It is the contention of the Manitoba Crop Insurance Corporation that the adjustment procedure carried out by its adjustors meets the guidelines established within the Compensation Agreement, and that the procedure is consistent for all producers appraised for waterfowl damage. It must be stated on behalf of the Manitoba Crop Insurance Corporation adjustors that these individuals are trained in the necessary procedures to ensure that a professional job of crop damage appraisal is carried out. They have nothing to gain by not adjusting the level of damage in the proper fashion, as they see it.

There is a definite divergence of opinion between producers and representatives of the Manitoba Crop Insurance Corporation regarding the equity and efficiency of the adjustment procedure. This may be due to a lack of information upon the part of the producer. If so, the best procedure to follow would be to clearly outline, at the time of adjustment, the guidelines the adjustor must follow in order to fulfill the terms of the Compensation Agreement. If producer dissatisfaction over the adjustment procedure is general, and would apply whether the adjustment was being made for waterfowl damage, hail damage, or drought damage, then the problem cannot be confined to the Compensation Program and cannot be dealt with here.

5.2.5 Increased Prevention Activities

It is the intention of this section to examine the theoretical effects of increasing the level of prevention activities for waterfowl crop damage in conjunction with a compensation program.

Prevention expenditures relative to total depredation control costs fluctuate from year to year depending upon the severity of damage and the amount of compensation paid. The relationship between costs of prevention and costs of compensation are shown in Table 5.4 and Table 5.5. These figures indicate that, except for the initial few years of the depredation control program, the program was financially geared towards the payment of compensation. This is indicated by the ratio of compensation to prevention expenditures which is approximately two to one. There is a strong, positive correlation between compensation and prevention costs as both are a function of the waterfowl population level and fall harvesting conditions. If fall weather prohibits harvesting before the influx of migrating waterfowl or if fall waterfowl populations are high, prevention activities will be increased. The increased prevention activities will reduce the extent of the additional crop damage, however, will not completely halt the increase. Therefore, additional compensation will still be required. This accounts for the positive relationship between prevention and compensation costs which was referred to previously. The relative merits of increasing prevention activities in light of this information is uncertain.

Prevention activities are beneficial in reducing damage levels to grain crops, given that the number of waterfowl bothering the grain is small, and their stay is of a short duration. Large numbers of waterfowl make many prevention activities (scarecrows, bangers, and shooting)

Table 5.4

Cost Relationship Between the Compensation and Prevention Programs

Year	Prevention (dollars)	Compensation (dollars)	Prevention/ Compensation (dollars)
1972	79,328.63	7,659.62	10,356:1
1973	73,758.87	39,143.24	1.88:1
1974	332,415.36	177,947.50	1.87:1
1975	178,825.66	357,084.78	0.50:1
1976	107,680.90	75,287.20	1.43:1
1977	166,369.10	411,160.63	0.40:1
1978	276,584.98	469,946.43	0.59:1
1979	225,277.68	281,404.30	0.80:1

Table 5.5

Total Expenditures for the Prevention and Compensation Programs
for the Duration of the Program

Year	Prevention (dollars)	Compensation (dollars)	Other' (dollars)	Total Depredation Control Costs (dollars)
1972	79,328.63	7,659.62	18,932.38	105,919.63
1973	73,758.87	39,143.24	8,987.65	121,889.76
1974	332,415.36	177,947.50	16,931.18	527,294.04
1975	178,825.66	357,084.78	22,966.79	558,877.23
1976	107,680.90	75,287.20	5,379.33	188,347.63
1977	166,369.10	411,160.63	20,000.00	597,529.73
1978	276,584.68	469,946.43	33,727.21	780,256.62
1979	225,277.68	281,404.30	18,279.85	524,961.83

Source: Information was obtained from the Manitoba Department of Natural Resources, (Wildlife Program Files).

'Other refers to costs associated with lure crop evaluation and Manitoba Crop Insurance Corporation administrative costs.

useless if the crop is not saved because the costs of undertaking the action have outweighed the benefits derived. If it is firmly believed that the crop will be destroyed and compensation paid regardless of whether prevention measures are undertaken, it is a better policy to forgo the prevention measures. If these measures are not attempted, the costs to society are decreased by the amount that would have been expended for such a purpose. Each individual situation must be assessed, however, in accordance with the ecological and economic factors prevailing at the time to determine whether implementation will be beneficial.

The above would indicate that the best policy towards the Prevention Program is a financially open-ended program operated in conjunction with the Compensation Program. In this manner, each individual situation can be evaluated on the relative merits of carrying out prevention activities. This assumes that the individuals required to make these decisions have the necessary understanding of the interrelationships between prevention, waterfowl population levels, and the level of damage. The individual would be required to decide what level of prevention would minimize the level of crop damage and, thereby, minimize the depredation control costs. The optimum combination of prevention and compensation would be the position where the cost of prevention plus the cost of compensation is minimized while the benefits are not decreased. If this could be accomplished, funds would be utilized more efficiently by reduced government expenditures.

It is impossible without quantitative analysis to determine the optimal trade-off between prevention and compensation. To do this, a separate study would be required to evaluate the benefits (reduced crop

depredation) that result from prevention activities. Subsequent to this, it would be necessary to determine the exact relationship between compensation paid and the level of prevention undertaken. From there it would be possible to determine the optimum trade-off point, and thus the effects of increasing prevention activities.

Outright extension of prevention activities would have an adverse effect upon the hunting population. The duration of time that waterfowl populations would remain in the fall would be shortened and the size of the populations remaining would be reduced. This would mean a lower number of birds available for local hunting purposes. Naturalists would not be restricted in the same sense as their use of the resource is not regulated. The alternate suggestion of co-ordinating the Prevention and Compensation Programs, in situations where prevention activities are increased and waterfowl are scared away, would have a negative impact on hunters. In situations where prevention activities are not deemed worthwhile and the waterfowl are not scared away, the hunter would not be affected.

Increased prevention activities by government agents creates a disincentive effect upon the producer with regard to implementation of his own prevention activities (actual or agronomic). High compensation levels in conjunction with increased prevention will create conflicting incentives for producers. Increased prevention will disperse waterfowl, whereas high compensation levels may induce producers to attract waterfowl indirectly by not undertaking damage prevention measures. There is room for, and a need of, an expanded analysis with regard to increased prevention.

5.3 METHODS OF RAISING FUNDS

The following sections deal specifically with two alternate proposals for financing the payment of compensation to agricultural producers. The first proposal concerns an increment to the present hunting license fee to obtain the required revenue. The second proposal involves the implementation of a spot-loss insurance program whereby revenues to cover crop losses are obtained from producer paid premiums. Certain questions are raised for both financial options with regard to the equitability of the procedures on the interest groups involved.

5.3.1 Increase Hunting License Fees

It has previously been stated that a resident Manitoban will pay a total of \$9.75 for the right to hunt migratory game birds within the province. A Canadian, non-resident of Manitoba will pay \$25.75 whereas a non-resident of Canada will pay \$45.75. These totals include a Wildlife Certificate fee, a Manitoba Game Bird License fee, and a Canada Migratory Game Bird Permit fee.

The total number of licenses sold and the total revenues raised from these sales for the years 1972 through 1979 are displayed in Table 5.6. Because the Manitoba Game Bird License totals include licenses sold for the purpose of hunting grouse and ptarmigan, this table was constructed calculating the revenue raised specifically from migratory waterfowl. The methodology used to do this is explained in a footnote to the table. Table 5.7 compiles the revenues raised by Manitoba and Canada into one table and compares these with the total costs of waterfowl depredation.

Table 5.6

Total Revenue Raised by the Province of Manitoba
from Migratory Game Birds

Year	Manitoba Game Bird Licenses	Wildlife Certificate	Total
	Licenses' (number)	Revenue'' (dollars)	Revenue''' (dollars)
			(dollars)
1972	41,333	168,954.25	92,999.25
1973	41,711	171,160.25	93,849.75
1974	37,167	144,019.25	83,625.75
1975	42,846	263,120.05	96,403.50
1976	46,681	330,763.50	105,032.25
1977	46,438	340,912.00	104,485.50
1978	50,169	364,968.25	112,880.25
1979	49,344	377,796.86	111,024.00

'The number of licenses sold for migratory waterfowl hunting purposes will equal the number of Migratory Game Bird Permits sold within Manitoba. Both licenses are required in order to hunt migratory waterfowl.

''The Manitoba Game Bird License fee for 1972-1974 was \$2.00. From 1975 onward, this fee was raised to \$3.75. Calculations are based accordingly.

This figure is calculated by taking the difference in the number of Manitoba Game Bird Licenses and Migratory Game Bird Permits, multiplying by the license fee for a resident Manitoba hunter, then subtracting this product from the total revenue raised from the Manitoba Game Bird Licenses. The assumption was made that licenses to hunt upland game birds would be purchased by Manitoba residents.

'''This figure is calculated by taking the number of licenses sold for the hunting of migratory waterfowl and multiplying by the correct fee.

Table 5.7

A Comparison of Revenues Raised Through Hunting with the Costs of the Waterfowl Depredation Program and the Actual Damage Estimates

Year	COSTS (\$)			REVENUES (\$)			
	Compensation	Prevention	Damage	Total	Manitoba	Canada	Total
1972	7,659	79,329	14,960	94,288	261,504	82,266	343,769
1973	39,143	73,759	87,164	160,923	265,010	83,422	348,432
1974	177,948	332,415	176,551	508,966	227,645	130,085	357,730
1975	357,085	178,826	919,776	1,098,602	359,524	149,961	509,485
1976	75,287	107,681	78,114	185,795	435,796	163,384	599,179
1977	411,161	166,369	1,032,669	1,199,039	445,398	162,533	607,931
1978	469,946	276,585	799,165	826,850	477,849	175,592	653,440
1979	281,404	225,278	542,327	767,605	488,821	172,704	661,525

'Damage refers to the revenue foregone (opportunity cost) because of waterfowl destruction of grain.

''Costs refer to the actual costs of waterfowl depredation; the costs of preventive actions plus the actual damage estimates (as opposed to the compensated damage). This reflects the true external costs to society because both prevention and compensation costs are a direct consequence of the ideal of society to preserve migratory waterfowl populations.

Over the six year period from 1974 to 1979, total revenues raised have doubled from 350,000 to 700,000 dollars. This is due partly to an increase in the number of licenses sold, and partly to an increase in the magnitude of the license fees. The costs of waterfowl depredation, which are assumed to equal the costs of prevention plus the value of actual crop damage, range from a low of 100,000 dollars in 1972 to a high of 1.2 million dollars in 1977. The trend is for an increase in costs over time, however, these costs may fluctuate yearly depending upon the severity of crop damage. The increase in costs will reflect the inflation rate, however, this element has been ignored throughout the study because the main comparisons carried out are within years as opposed to between years.

Total revenues raised from the sale of hunting licenses are consistently lower than the costs of waterfowl depredation, except on a rare occasion such as 1976 when both damage levels and prevention activities were low. The difference between revenues raised and costs incurred is in the range of 150,000 to 500,000 dollars.

Table 5.8 breaks down the sale of Manitoba Game Bird Licenses between Manitoba residents, non-resident Canadians, and non-resident aliens. It was found that, on average, 91 percent of migratory waterfowl hunting licenses sold within Manitoba are sold to local residents, 2 percent are sold to out of province Canadians, and 7 percent are sold to non-Canadians (predominately Americans). This would indicate that, while waterfowl are within the boundaries of the province, the major users of the resource are Manitobans. Once the waterfowl leave the province, Manitoba no longer has the right to appropriate revenue from a resource which

Table 5.8

Distribution of Manitoba Game Bird Licenses Sold
Between Resident and Non-Resident Manitobans

Year	Manitoba Resident (number)	Non-Resident Canadian (number)	Non-Resident Alien (number)	Total (number)
1972	44,453	1,140	2,541	48,134
1973	44,504	1,175	2,570	48,249
1974	40,209	968	2,035	43,212
1975	44,375	850	2,570	47,795
1976	49,256	1,185	4,004	54,445
1977	50,970	1,041	4,152	56,163
1978	54,093	1,199	4,363	59,655
1979	46,181	1,463	4,699	52,343
Average	46,755	1,128	3,367	51,250

it has produced. Revenues accrue to the state or province which sells the license within which the waterfowl are hunted.

Between 1972 and 1979, Canada sold an average of 424,129 Migratory Game Bird Permits per year; or stated alternately, 1.5 million dollars worth of revenue was raised per year from the migratory waterfowl resource.⁷⁰ The contributions made by the federal government to the Compensation Programs of the prairie provinces averaged 475,000 dollars per annum for the same time period, while their contributions to the Prevention Program averaged 187,000 dollars per annum. Their total contributions were 672,500 dollars per annum. The remaining 900,000 dollars average revenue raised per year can be assumed to go toward the preservation of waterfowl.

In the event that a political decision was made that the user should pay for the external costs associated with waterfowl preservation, many questions would be raised with regard to how this could be accomplished. At the present time, the only facet of use for which a quasi-market system exists through which revenues could be raised is the sale of licenses for hunting purposes. If revenues were to be raised to meet the total external costs of waterfowl preservation, this would be the primary source utilized. However, there are three alternate license fees which could be increased, each of which is structured on a different premise and whose revenues accrue to different sources. Some questions that should be settled before the fee structure is changed are presented below.

⁷⁰ S. Wendt and C. Hyslop, "Migratory Birds Killed in Canada During the 1979 Season," Ottawa: Canadian Wildlife Service Report # 115, September 1980. p. 3.

Questions:

1. Which of the three fees should be increased?
2. Should both levels of government receive equal benefits from raising fees, or should they be collected by one source on the premise that the revenues will be used for one purpose?
3. If the Manitoba Game Bird License fees are increased from their present levels, should they be increased proportionally for resident-Manitobans, non-resident Canadians, and non-resident aliens; or should they be increased for all by a standard amount?
4. Should the increase occur on the Wildlife Certificate fee whose original intent was for contribution towards compensation schemes for wildlife inflicted crop damage?
5. Should the Migratory Game Bird Permit be increased to include a higher user fee for non-Canadian residents than for Canadian residents?

The answers to many of these questions are political in nature and, therefore, the answers cannot be supplied here. To analyze the extent by which the fees would need to be increased to cover the total costs of waterfowl depredation, a few simplifying assumptions were made.

Assumptions:

1. The Wildlife Certificate fee will be increased at a standard rate so that no user is required to contribute more than another. Although resident Manitobans may pay more through general tax revenues than non-Manitobans towards preserving and maintaining waterfowl populations which are used outside the province, the same may also be true of indi-

viduals from other provinces and states. These effects should then cancel out relative to one another. The Wildlife Certificate was chosen to be increased because it was originally designed to cover the costs of wildlife damage. The increment could be applied to any one of the three fees, or to some combination of the fees. The Wildlife Certificate fee is merely used as a vehicle to test the size of increase necessary, given the present market system, to cover depredation costs.

2. The demand for hunting licenses is perfectly price inelastic. It is the contention put forth here that the market system for hunting licenses does not operate in accordance with the standard laws of supply and demand. Neither the price level or the quantity of licenses sold is established within a market system, but is controlled by government regulation. The quantity of licenses available for sale each year is a quota based upon the expected waterfowl population level, while the price is established arbitrarily and independently of the marginal valuation of the resource by hunters. The assumption can be made that a Manitoba hunter is charged a fee well below his marginal valuation of the resource for the following reason. If a non-resident Manitoban is willing to pay up to \$45.75 to obtain the right to hunt migratory waterfowl, then a charge of \$9.75 seems minor in comparison. Given this difference in price, it can be assumed that an increase of a few dollars will not affect an individual's decision regarding the purchase of a license. This is reaffirmed by the fact that the license fee constitutes a very small proportion of the total costs associated with hunting. An increase of a few dollars for the fee would have little effect on the hunter's demand for a license, given the broader scope of costs.

What is being argued is that because of the failure of the market system to establish a price representative of the marginal valuation of consumers (as opposed to arbitrarily established by regulation) and to determine a quantity that will be demanded at that price (as opposed to license quotas), the assumption can be made that the demand for a hunting license will be price inelastic for small increments in the fee charged.

3. The only relevant costs are the costs external to waterfowl preservation. Preservation costs are assumed to be covered by general tax revenues from the state, province, or country within which preservation activities are implemented.

Table 5.9 displays the total revenue raised from license fees with the Wildlife Certificate fee set at \$2.25. It then goes on to display the total revenue that could be raised if the fee was increased to \$4.25, \$5.25, and \$6.25 for the years 1972 through 1979. If the total revenues and total costs are averaged over the past eight years, it can be seen that a \$4.50 Wildlife Certificate fee would cover the costs of the Prevention and Compensation Programs, even with a compensation level designed to cover the full value of crop damage. This amounts to a fee increment of \$2.25 per hunter of waterfowl. It is important that the qualification be made that excess revenues in a low depredation year be carried forward to cover losses in heavy depredation years.

Placing the financial burden of crop damage upon the hunter population once again raises the question of equity. Should the hunter population be required to bear the cost associated with waterfowl depredation when they constitute only a small fraction of the total group

Table 5.9

The Effect on Total Revenue of Increasing Wildlife Fees

Year	\$2.25	Total Revenue if Fee'			Total Costs (dollars)
		\$4.25	\$5.25	\$6.25	
1972	344,219.50	426,885.50	468,218.50	509,551.50	94,288.22
1973	348,432.00	431,854.00	473,565.00	515,276.00	160,923.13
1974	357,730.00	432,064.00	469,231.00	506,398.00	508,966.39
1975	509,484.55	595,176.55	638,022.75	680,868.55	1,098,601.70
1976	600,179.75	693,541.75	740,222.75	786,903.75	185,795.34
1977	607,930.50	700,806.50	747,244.50	793,682.50	1,199,038.90
1978	653,440.50	753,778.50	803,926.86	854,116.50	826,849.76
1979	661,524.86	759,792.86	808,926.86	858,060.86	767,604.76
Average	510,367.68	599,237.43	643,672.34	688,107.18	605,258.50

The average is for the years 1974-1979. The years 1972 and 1973 were excluded because it was felt that the actual crop damage estimates were not accurate because of a general lack of knowledge regarding the program and, therefore, not a large number of damage victims would make claims.

Assuming Demand is perfectly price inelastic:

Total revenue can be calculated by taking:

$$\begin{aligned} & \text{Number of Migratory Game Bird Permits Sold} * \text{Fee} = \text{Revenue*} \\ & \text{Revenue*} + \text{Revenue from Manitoba Game Bird Licences} + \\ & \text{Revenue from Wildlife Fees (at the new rate)} = \text{Total Revenue} \end{aligned}$$

making use of the resource? Waterfowl for hunting purposes is one of many demands or values placed upon waterfowl, however, it is the only demand for which a market or quasi-market system operates. It is, therefore, the only demand from which revenues can be raised.

Other demands for the waterfowl resource would include non-consumptive uses such as viewing or photographing (aesthetic value), the knowledge that the resource exists (existence value), the knowledge that the resource will be available for use at some future time if the desire exists to utilize it (option demand), the possibility that through some facet of its composition it may contribute to scientific research (scientific value), and the knowledge that the resource will be maintained for use in future time periods (inter-generational value).⁷¹

Use of the waterfowl resource for the previous purposes cannot be regulated because of the non-exclusion characteristic of the resource. If use is unregulated, a price cannot be appropriated from the users. These individuals are not required to contribute to the costs associated with depredation. Charging hunters for the full amount required to cover these costs is as inequitable as having the producer bear the full costs of crop damage. Society must make its own contribution on behalf of migratory waterfowl instead of placing the full burden upon any particular subset of the population.

The effect of an increase in hunting license fees has been discussed from the standpoint of the hunter and from the standpoint of the agricultural producer. The hunter would be adversely affected because hunt-

⁷¹ John A. Sinden and Albert C. Worrell, Unpriced Values: Decisions Without Market Prices (New York: John Wiley and Sons, 1979), pp. 444-465.

ing costs would be increased, whereas the producer would be beneficially affected because full compensation could theoretically be received.

All other users of the resource would be benefited because funding would not be required to come out of tax revenues. Producer animosity to waterfowl would be reduced under full compensation which would, in turn, alleviate the pressure upon governments to reduce waterfowl population levels. The governments involved would also be benefited because it would offer relief from the financial burdens of the Compensation and Prevention Programs while, at the same time, relieve themselves of public pressure to improve the present compensation scheme.

Raising hunting license fees is one method by which the revenue required to compensate producers for damaged grain could be raised, however, it is also one of the more inequitable methods. It perpetuates the problem that already exists, namely, that one group pays the costs while others who value the resource equally, if not more, receive the benefits free of charge. The question of equity once more becomes a paramount issue in the discussion of waterfowl crop depredation. A supplementary study could be undertaken to examine the concept of a market system functioning free of quantity and price restrictions for the hunting of migratory waterfowl. If such a system were allowed to develop, the assumption regarding a perfectly price inelastic demand would no longer hold true.

5.3.2 Spot Loss Insurance

The concept of a spot-loss insurance program for migratory waterfowl inflicted crop damage was proposed as a solution to the current controversy. Spot-loss or uni-risk insurance is implemented in situations "where the management decisions or actions of a producer will not effect the susceptibility of a field of grain to a particular form of damage."⁷²

The spot-loss option for waterfowl damage could theoretically operate in a fashion similar to the spot-loss option for hail damage, which operates in the following manner. For an additional premium, producers can receive coverage for hail damage on all crops insured under all-risk coverage. The level of coverage is limited to the amount of all-risk coverage assumed under the contract signed. The structure and operation of hail insurance coverage is outlined in Section 24 of the Manitoba Crop Insurance Act.⁷³ By insuring against hail damage under their regular contract, the producer pays only one-half the premium, the federal government pays the other one-half, and the province pays the costs of administration.

In addition to spot-loss hail insurance, there is what is termed Part 2 hail coverage. To receive this coverage, the producer pays 100 percent of the premium costs plus the full costs of administration. In return, coverage up to a maximum of 60 dollars per acre can be received. Part 2 coverage can be purchased regardless of whether the producer is

⁷² D. W. Ware, "Crop and Livestock Insurance in Canada," The Economic Annalist October(1960), pp. 101-109.

⁷³ See Appendix B for an outline of Section 24 of the Manitoba Crop Insurance Act.

covered under all-risk, however, the producer bears the full cost because premiums are not subsidized.

To analyze the probability distribution of waterfowl damage occurring throughout the Province of Manitoba (Map I of Chapter II), the damage areas were plotted on a map of Manitoba. The areas where severe damage occurred (Oak Hammock Marsh, Marshy Point, and to some extent Oak Lake) tended to be small in size and number. A producer within these areas has a probability of approximately one of incurring damage. Producers within a few miles of the same area may never receive damage or incur damage only one year out of several.

In areas such as the Northwest, waterfowl damage will occur every year, but the level of damage is so small that compensation could not be received unless the minimum claim value were lowered. A proposed insurance scheme would not be well received in such an area, because of the low damage level and the infrequency per producer of damage occurring.

The majority of producers within the province seldom receive crop damage of this nature (probability approaching zero) and, therefore, the majority of producers would not be interested in a proposed insurance program.

The lack of a probability distribution for waterfowl crop damage makes the concept of a spot-loss insurance program difficult to formulate for equity and efficiency. Since the risk of waterfowl damage cannot be spread over a wide population of producers and only producers with a high risk of receiving damage will opt for coverage, the premiums will be equal to the payments received in return. The result is a lump sum transfer by producers to the government in the form of premium pay-

ments, and a lump sum transfer back to the producers in the form of damage payments. There exists no potential to pool or spread the risk and, therefore, the costs to producers will equal the gains. In effect, the producer will bear the same financial burden associated with waterfowl crop losses as under the present Compensation Program. (The producer receives slightly less than one-half the value of grain destroyed through the Compensation Program. Under a spot-loss insurance option, one-half the premiums paid which are returned as coverage are supplied by the producer.) Waterfowl crop damage, like flood damage, is confined to too specific an area to make the insurance concept a feasible policy option.

The alternative to allowing producers to have the option of purchasing coverage would be to incorporate the cost into the premium rates of general crop insurance coverage. This would spread the costs of the risk over a large population resulting in lower contributions per producer. It would also continue a policy whereby producers bear the burden of the financial losses created by waterfowl damaging their crops. Inequities would be greater than those presently in existence because the costs of waterfowl crop damage would be spread to producers who seldom, or never, incur crop damage. In addition, these costs would only be spread to producers purchasing crop insurance coverage.

Manitoba Crop Insurance general coverage presently includes waterfowl damage as a natural hazard but does not offer coverage on a separate basis. Coverage is offered on the same basis of damage as the general coverage provided on an insured crop, which is to the level necessary to cover production costs. It is for this reason that a spot-loss option for waterfowl damage was proposed.

There exist several reasons why a spot-loss insurance program for waterfowl damage, similar to the one for hail damage, is not considered a feasible policy option. These include:

1. Inclusion of spot-loss protection would result in increased premium costs to the point that insurance protection would be uneconomical.

2. Waterfowl damage occurs in specific areas for the most part and, therefore, the benefits would accrue to only farmers within such areas, but the costs of such benefits would have to be included in the premiums of all farmers who insured.

3. Producers should not be required to carry any portion of the cost of compensation for loss resulting from migratory waterfowl--a protected hazard.

4. Farmers would be required to purchase all-risk crop insurance coverage in order to benefit and not all farmers choose to do so. Also not all farmers insure all the crops they grow under all-risk coverage.

5. Inclusion of such benefits would lead to the breakdown of a sound program because it is not possible or practical to determine such losses accurately on a spot-loss basis.

6. All-risk insurance covers losses to⁷⁴ the level of approximately the cost of production inputs.

Several of the points cited above have no economic basis but are the value judgements of individuals involved in the controversy over a crop insurance spot-loss option. The validity of the statements could be contested, however, the major concern of this analysis is not with these value judgements, but with the economic basis for a spot-loss insurance program. It was determined previously that the spot-loss insurance op-

⁷⁴ Source: The above criticisms of a spot-loss insurance option for waterfowl damage under general all-risk coverage were proposed by the Saskatchewan Crop Insurance Board, the Manitoba Crop Insurance Corporation, and the Alberta Hail and Crop Insurance Corporation. These criticisms were formulated at an inter-provincial meeting held to evaluate the implications of insurance for waterfowl inflicted crop damage.

tion is infeasible because there is no random probability distribution for damage occurring. Damage is concentrated in a small number of areas which are not large in size. The major incidence of damage falls upon the producers situated within these areas. As a result, there exists no potential to spread or pool the risk of waterfowl crop damage occurring. Therefore, a spot-loss insurance program for migratory waterfowl is considered to be an infeasible policy option.

5.4 CONCLUSIONS AND GENERAL COMMENTS

The Compensation Program could be operated more beneficially for the agricultural producer if the level of compensation was raised to cover the full value of the grain destroyed. Full value compensation would, in many instances, provide producers with a disincentive to undertake practices which would aid in the minimization of waterfowl inflicted crop losses. Because of the disincentive (efficiency) effects, a lower level of compensation (somewhere in the neighborhood of 90 percent of the value of the crop destroyed) is recommended.

A maximum compensation per acre program was reviewed and the conclusion was reached that this form of compensation would be best applied where costs of production, rather than value of crop damage, was the criteria upon which compensation was to be based. Cost compensation incorporates inequities to the recipient into its basic structure, however, it does not promote many of the disincentive effects that are associated with full value compensation. However, the disincentive effects associated with full value compensation can be removed by lowering the percent coverage to less than 100 percent. It remains the preferred option.

The disincentive effects existing under full value compensation will exist only in the circumstance that producers do, in fact, receive 100 percent of the value of damaged grain. According to producers surveyed and to related literature, this is seldom the situation because of the inaccuracies involved in the adjustment procedure. If producers are not adjusted correctly (or feel that they are not adjusted correctly) for the yield and percent damage on the field in question, they will react as though they are not receiving payment for the full value of damaged grain. Because the producer is a profit maximizer, the inefficiency effects previously hypothesized will not occur and practices will be implemented which insure receipt of the maximum return possible.

Increased prevention activities will have beneficial effects given that the program is operated in conjunction with the Compensation Program to obtain the optimal trade-off between the two. This trade-off point must be determined by the individual in charge of implementing prevention activities for the area, and must be determined for the particular situation being evaluated. If proper data was available, a supplementary study could be undertaken to determine the effectiveness of prevention measures in reducing crop damage and the correlation between prevention activities and compensation levels. Without this information it is impossible to determine to what extent prevention should be increased.

The methods analyzed for raising funds; increased hunting license fees and spot-loss insurance premiums for waterfowl damage, have serious equity implications. The increment to the hunting license fee required to cover total depredation costs is small (\$2.25), however, it places

the financial burden upon one user group (hunters). Other non-consumptive users would still be allowed to use the resource free of charge. The spot-loss insurance program, if operated in the same fashion as the spot-loss hail insurance program, would continue to place approximately one-half the financial burden of waterfowl inflicted crop damage upon agricultural producers. The system would also spread the cost of preservation externalities over a larger number of producers.

As a result of the equity implications, neither system is recommended as a serious alternative to the Compensation Program. The Compensation Program is still deemed to be the best policy option to deal with the problem, because it spreads the costs over all individuals who, in some manner, benefit from the resource. The necessary revenues are obtained from general tax revenues and, each individual's contribution is small. It is recommended that the level of compensation be increased above its present level, to account for equity considerations, but below the full value of crop damage to avoid inefficiency in the agronomic practices of agricultural producers.

Chapter VI

SUMMARY AND POLICY IMPLICATIONS

6.1 SUMMARY AND CONCLUSIONS

The structure of the Waterfowl Crop Damage Compensation Program presently in existence for the prairie provinces of Canada has not met with resounding success from the perspective of both the agricultural producers receiving compensation, or the governments involved in the payment of compensation. For this reason, it was considered desirable to examine more closely the structure and administration of the program to determine its weaknesses and strengths in order that recommendations can be made with regard to its improvement or replacement.

To achieve the above objective, the first step taken was to review the basic background to the crop depredation problem for the prairie provinces. The ecological components existing in western Canada, and the implications of these components upon crop damage, were outlined in detail.

The second chapter was designed to concentrate the setting of the problem within a Manitoba context. This consisted of a historical review of the Compensation Program, its expanded coverage over time, and an historical review of its counterpart, the Prevention Program. The structure and administration of both programs were outlined in terms of financing, payment procedure, activities involved, and inequities felt to exist. The severity of crop damage and the relative coverage offered

under the Compensation Program were the prime areas of interest which were examined. The producer and government concerns were reviewed with respect to increased coverage levels, which could theoretically relieve the inequities upon the cost structure of agricultural producers caused by the waterfowl preservation policies carried out by government agents.

The third chapter was concerned with the economic theory associated with the existence of a waterfowl species; its common property nature which leads to extinction and the necessity for preservation; the externalities created by the actions of preservation groups; and, the efficiency implications of a compensation program structured to relieve the inequities created by preservation programs. The conclusion was reached that a trade-off must exist between equity and efficiency. The major compensation schemes reviewed, net and gross value compensation, would affect the marginal value and marginal cost conditions upon which a producer basis his profit maximizing behaviour. Gross value compensation would induce producers to discontinue prevention activities because compensation would not be received for the cost involved, but rather, compensation would be received for the grain damaged. Net value compensation does not offer the same incentive to reduce prevention activities because the producer receives compensation for the prevention cost.

The rate of compensation necessary to achieve equity is dependent upon the criteria established by the government with regard to what constitutes equity. From the perspective of producer efficiency, the rate of compensation should be established below the value of actual grain damaged (compensation rate of less than one). This level will not induce producers to discontinue prevention action, either agronomic or scare device oriented.

The fourth chapter takes the analysis one step further. By reviewing the existing legislation that has been passed by the federal and provincial governments with regard to migratory waterfowl, it was believed that some concept of the jurisdictional and legal responsibilities of the two groups could be determined. The criteria that each group establishes, and the actions they carry out, give an indication of what the interests of society are assumed to be. By attaching some degree of responsibility to the groups involved in preservation, it was believed that a conclusion could be reached as to a justifiable cost-sharing arrangement and the degree of compensation that should be dispensed.

From the legislation that has been passed, it is not possible to determine an exact delineation of responsibility between the federal and provincial governments. In a situation of this type, where both levels of government are involved, it may prove to be the best policy to apply a similar ruling to that which exists for private nuisance law, i.e., responsibility be shared on an equal basis. The costs could be divided in accordance with this ruling.

The level of compensation that the governments should distribute to producers incurring crop damage should be increased. However, the government under the tort law concept of "legislative authority" has no legal obligation to offer compensation.

The last chapter attempted to analyze alternative policy options which are presently being considered to deal with the problem of migratory waterfowl inflicted crop damage. These options included: increasing the percent level of compensation; increasing the per acre maximum; increasing hunting license fees; and, implementing a spot-loss insurance

program. The analysis was not quantitative in nature, but rather dealt on a theoretical level as to what would be the effect of each of the policy alternatives on the different interest groups involved.

6.2 RESULTS OF ANALYSIS

Based upon the findings of Chapters' II or IV, a 100 percent compensation level was considered the most equitable. A 100 percent compensation level for the Province of Manitoba would mean a 100 percent increase in federal or provincial contributions from 300,000 to 600,000 dollars. The additional financial requirement does not appear to be the major deterrent to the implementation of such a program. The effects upon the efficiency of agricultural producers was considered the major problem. One hundred percent compensation was hypothesized to offer a disincentive for producers to undertake preventive action and, in some situations, could prove to be a disincentive for undertaking efficient harvesting practices.

An increase in the maximum coverage per acre allowed through the Compensation Program was analyzed, however, it was concluded that a substantial number of additional inequities were introduced through this form of coverage. This option discriminated against producers who were growing higher valued grain types; who were situated upon low productivity soils; and who had above average production costs. Once again, the increased financial contributions necessary to increase the per acre maximum was not the major disincentive for this form of compensation coverage.

A third policy option analyzed dealt with an alternate method of raising the funds necessary to supply 100 percent compensation. This consisted of increasing hunting license fees. It was found that a \$2.25 increase in one of the fees presently charged would supply the required revenue. This method was not recommended, however, because of the equity implications involved. It is not equitable to have the hunter population pay the full cost of waterfowl preservation as the hunter is a very small subset of the total group deriving benefits from the waterfowl resource. There may be some justification for this group to contribute a greater amount than others who do not physically appropriate the resource, however, the extent of the additional contribution is debatable. It would be dependent upon the relationship between consumptive and non-consumptive valuations of the resource which are difficult to measure.

The last option reviewed was the incorporation of waterfowl crop damage as a spot-loss option under general crop insurance coverage. This was not considered a feasible policy option because of the lack of a random probability of damage occurring for the province. In this situation there is no potential to spread or pool the risk. In addition, if waterfowl are not considered to be a natural hazard, then the producer should not be expected to pay any portion of the premiums for protection against this hazard. Under the hail insurance option producers contribute one-half the premium payment. If the system were altered to incorporate the premium costs across all producers who insure under general coverage, this would again be inequitable as the costs would be born by individuals who might never receive any benefits from the waterfowl dam-

age spot-loss option. On equity grounds, a spot-loss option for waterfowl damage was dismissed.

The overall conclusion was that a percent based compensation program should be implemented with the required funding coming from general tax revenues. In this manner, no individual group is required to contribute a greater amount than another. The preferable rate of compensation should be set at greater than .8 but less than one, in order that disincentive effects are not promoted and at the same time a high level of equity is maintained.

6.3 LIMITATIONS OF THE STUDY

Certain elements of this study were hypothetical in nature. They primarily focussed upon the disincentive and incentive motivations of agricultural producers created by alternate levels of, and schemes for, compensation. The actual effects of these levels and schemes are not determined but are hypothesized to be what would occur. There is no actual occurrence which can be taken and compared to the hypothetical occurrence. However, there is a good theoretical basis for the hypothesis that are put forth, and it is strongly believed that the hypothesis would stand.

The data regarding actual damage levels was obtained from one primary source, the Manitoba Crop Insurance Corporation. The agricultural producers surveyed made the claim that this data underestimates the damage level by as much as one-third the actual level. This would imply that many of the calculations regarding the necessary funds required to pay 100 percent compensation would be underestimated. However, the validity

of the above claim has not been tested. It is known that adjustors follow the guidelines established within the Compensation Agreement and the damage estimates are indicative of these guidelines.

The analysis undertaken throughout the study did not make allowances for inflationary trends in damage calculations, changes in price levels, or changes in production costs. This was justified by claiming that comparisons were being made within, as opposed to between, years. This was not always the situation and, therefore, some discrepancy may exist in the comparisons.

Additional costs incurred by agricultural producers were assumed to be negligible because of an inability to quantify them. The analysis carried out, without consideration of these costs, cannot accurately predict the behaviour of producers because these costs may constitute a major factor in their decision processes.

In order to determine the maximum coverage per acre necessary to allow for full value of losses, the assumption was made in the analysis of per acre maximum coverage levels, that the total compensation payments divided by the present maximum of 50 dollars per acre yields the total number of acres damaged per year. This assumption is not realistic as many claims do not receive the full maximum per acre. The effect of this assumption upon the accuracy of the results is difficult to predict, although given other comparisons there did not appear to be an adverse effect.

The limitations of this study center around the fact that the accuracy of the data available is uncertain, and particular elements of the analysis are hypothetical and cannot be tested. This mainly refers to

the effects of increased compensation levels upon the agronomic practices of agricultural producers.

6.4 SUGGESTIONS FOR FURTHER RESEARCH

There are several specific areas included in this study where research efforts should be extended.

A closer evaluation of the disincentive effects that could occur under alternate rates of compensation and alternate compensation schemes is required. The disincentive effects are only hypothetical and, in order to test the validity of the assumptions, should be referred to a specific situation.

The possibility of establishing a market system for the sale of hunting licenses should be examined. A system of the user paying for the resource is one method by which revenues could be raised, even though it is concluded to be inequitable.

The effect of discounting the damage and compensation figures should be examined for the duration of the program. The effects of actual price changes in the market value of grain should be separated from these components and examined separately. In addition, a comparison of damage calculations, using the price established in the Compensation Agreement and the market price (adjusted to reflect the standing value of grain), should be carried out. This would help to determine the extent (if any) that the value of damaged grain is underestimated.

A comparison should be carried out of the Compensation Program prior and subsequent to the 50 dollars per acre maximum coverage level. This would establish whether the increase in the maximum is an increase in

the level of coverage or simply an increase in keeping with rising prices. An increase in the level of coverage refers to an increase in the amount of damaged grain (bushels/acre) for which the producer receives compensation. An increase in keeping with rising prices refers to an increase in the value of grain (price/bushel) for which the producer receives compensation. The producer, with this form of increase, may still be receiving compensation for the same level of damage. The analysis cannot be implemented at the present time because there exists only one year's data for the 50 dollar maximum coverage level.

A more extensive study of the trade-off between compensation and prevention activities should be undertaken. The correct combination of these two components could result in the minimization of damage, with a resulting minimization in total costs.

An evaluation of the total costs to the producer should be undertaken. This would include a study of actual damage figures obtained separate from the guidelines established within the Compensation Agreement which the adjustor's must follow. It would also include the additional costs of labour, prevention, harvesting and tillage, weed control, and a premium for inconvenience which the producer suffers.

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APPENDIX A

RESULTS OF SURVEY CONDUCTED THE SUMMER OF 1980

REGARDING DAMAGE TO AGRICULTURAL CROPS BY

MIGRATORY WATERFOWL

Part A: CompensationQuestion 1

	<u>Area I</u>	<u>Area II</u>	<u>Area III</u>	<u>Total</u>
a) Have waterfowl caused damage to your crops within the past 10 years and, if so, which crops were affected?				
i) Wheat	14	6	11	31
ii) Barley	18	9	13	40
iii) Oats	6	3	1	10
iv) Other (specify)	0	1	0	1
b) Was damage caused by:				
i) Migrating waterfowl	15	8	2	25
ii) Local nesting waterfowl	1	0	12	13
iii) Both of the above	4	2	1	7

Summary

The first two areas surveyed (Bifrost-Fisher Branch, hereafter referred to as Area I; and Rockwood-St. Andrew, hereafter referred to as Area II) received the greatest amount of crop damage from migratory ducks and geese during the fall of the year. Sandhill cranes caused problems in some instances but damage appeared to be relatively localized and infrequent. Damage by sandhill cranes was severest in the spring of the year.

Crops affected, in order of greatest damage, were barley, wheat, and oats. Flax and rapeseed, in the sample surveyed, were never bothered.

The Pothole country, hereafter referred to as Area III, received the severest damage from local nesting waterfowl (which consisted primarily of mallard and pintail ducks). Damage occurred throughout the summer but was severest in the fall when the young were fully grown. At this time, the ducks consumed and trampled larger quantities of grain as it lay in swaths, and as they congregated for the fall migration. The effects of migrating and nesting waterfowl are impossible to separate. Both groups create the greatest problems during the fall staging period. For the purposes of this paper the two types of waterfowl will not be distinguished between in future references.

Ratings By Individual Producers of Crops Most Frequently
Damaged by Waterfowl'

	<u>Area I</u>	<u>Area II</u>	<u>Area III</u>	<u>Total</u>
1. Wheat				
a) first	7	1	6	14
b) second	7	5	5	17
c) third	0	0	0	0
2. Barley				
a) first	12	9	8	29
b) second	3	0	5	8
c) third	3	0	0	3
3. Oats				
a) first	1	0	1	2
b) second	3	2	0	5
c) third	2	1	0	3

'This table was designed to exhibit the order of importance of cereal grains damaged by migratory waterfowl. Out of 45 individuals questioned, 29 (65%) felt barley was the most frequently damaged grain, 14 (31%) felt wheat to be, and 2 (4%) selected oats.

All told, out of 45 individuals, 31 mentioned damage to wheat as compared to 40 for barley and 10 for oats.

It can be concluded that the order of preference for grains consumed by migratory waterfowl is barley, wheat, and oats.

Question 2

Indicate year damage received, amount of compensation received,
personal estimation of damage

Area I

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Producer Surveyed	Year of Damage	Compensation (dollars)	Actual (producer estimate)	Actual (MCIC estimate)
1	1975	1,781.42	3,000.00	4,603.98
	1977	593.63	1,000.00	1,888.84
	1978	694.68	1,800.00	1,722.25
2	1977	250.00	2,000.00	1,100.00
3	1975	1,000.00	1,000.00	3,500.00
4	1978	915.97	1,800.00	1,629.52
5	1974	92.25	500.00	500.07
6	1978	340.62	1,500.00	836.28
	1979	150.00	150.00	243.60
7	1978	424.78	1,000.00	1,189.39
8	No claim	--	1,000.00	--
9	1974	327.60	1,200.00	436.80
	1977	60.50	450.00	252.00
	1978	434.54	3,250.00	1,381.01
	1979	6,190.61	25,000.00	11,313.37
10	1975	1,321.21	1,450.00 +1,800.00	6,257.59

(Continued)

Area I (Continued)

Producer Surveyed	Year of Damage	Compensation (dollars)	Actual (producer estimate)	Actual (MCIC estimate)
11	1975	2,038.38	4,000.00	2,523.82
12	1978	1,089.58	1,269.56	5,118.04
	1979	1,319.56	1,600.00	1,297.86
13	1978	1,906.81	4,500.00 8,000.00 over time	4,771.94
14	1975	452.50	700.00	1,449.75
	1977	000.00	100.00	--
15	1975	529.00	1,200.00 1,400.00 over time	1,379.25
16	1975	335.00	500.00 3,000.00 over time	1,507.50
17	No claim	--	900.00 over time	--
18	1975	130.93	400.00	476.73
	1977	267.13	400.00 1,200.00 over time	787.67
19	1975	635.19	1,500.00 1,800.00 over time	2,233.64
20	1977	100.00	500.00	360.00

Predominately 100 Percent Compensation Area

Area II

Producer Surveyed	Year of Damage	Compensation (dollars)	Actual (producer estimate)	Actual (MCIC estimate)
21	1977	397.50	1,200.00	1,501.00
22	1978	offer 750.00	16,550.00	2,652.75
	1979	234.59	3,000.00	387.52
23	1974	615.01	1,230.00	615.01
	1978	3,266.35	6,532.70	3,266.35
24	1974	582.40	582.40	582.40
25	1978	1,067.60	1,067.50	1,067.60
26	1975	527.19	527.19	527.19
	1977	2,099.00	2,099.00	2,099.00
	1978	1,553.78	1,553.78	1,553.78
27	1975	4,270.00	5,000.00	4,270.00
	1976	10,034.00	13,000.00	10,034.00
	1978	4,689.06	6,000.00	4,689.06
	1979	821.56	1,200.00	821.56
28	1974	882.00	1,600.00	832.00
	1977	4,003.88	8,000.00	4,003.88
	1978	3,830.00	8,000.00	3,830.00
	1979	380.00	750.00	380.00
29	1978	1,460.09	1,700.00	1,460.09
30	1974	3,185.08	5,000.00	3,185.08
	1975	1,841.00	2,600.00	1,841.00
	1977	1,260.00	1,660.00	1,260.00
	1978	9,720.00	17,000.00	9,720.00

Area III

Producer Surveyed	Year of Damage	Compensation (dollars)	Actual (producer estimate)	Actual (MCIC estimate)
31	1978	132.93	175.00 600.00 over time	461.08
32	1978	748.80	6,300.00	4,492.80
	1979	654.00	2,450.00	1,009.25
33	1977	511.15	3,000.00	2,453.51
34	No claim	--	2,500.00 over time	--
35	1975	145.51	550.00	189.86
36	1977	303.44	1,000.00	1,334.67
37	1977	385.87	800.00	945.36
38	1977	225.10	800.00	184.99
39	1977	51.12	250.00	184.99
40	1974	324.14	650.00	432.18
	1975	202.66	450.00	891.51
41	1974	1,059.75	2,500.00	1,384.52
42	1977	159.00	400.00	890.40
43	1975	196.58	350.00	474.11
44	1977	1,344.62	2,000.00	2,756.52
45	1977	433.52	1,200.00	1,734.48

Question 2

Summarization By Area of Compensation Received By Individual
Producers Compared to Estimated Actual Loss Figures

	Area I	Area II	Area III	Total
<u>Damage</u>				
1. Compensated	23,381.89	58,232.48	6,878.19	88,492.56
2. Actual (producer)	79,869.56	119,152.57	25,975.00	224,997.13
3. Actual (MCIC)	58,760.89	59,491.66	21,715.24	139,967.19
<u>Ratio</u>				
1. Act./Comp. (farm)	3.42	2.05	3.78	2.54
a) Comp./Act. (farm)	.29	.49	.26	.39
2. Act./Comp. (MCIC)	2.51	1.02	3.16	1.58
a) Comp./Act. (MCIC)	.40	.98	.32	.63

Summary

For the years 1974 through 1979, the total amount paid through the compensation program to the 45 individuals surveyed was \$88,492.56. The producers estimated their actual losses to be approximately \$224,997.13. This is approximately 2.5 times greater than the compensation they received. The Manitoba Crop Insurance Corporation's estimates of actual damage for these same 45 producers was \$139,957.79 which is 1.5 times greater than the compensation paid. The producer's estimates of actual grain damage are 1.6 times greater than the estimates supplied by the MCIC.

Area I producers estimated their actual losses to be 1.36 times greater, or of 36 percent greater magnitude, than the MCIC adjusted for. Area III producers estimated their actual losses to be 1.2 times greater, or of 20 percent greater magnitude, than the MCIC adjusted for.

Area II proved interesting because of the 100 percent compensation offered to agricultural producers for crops damaged by migratory waterfowl. It would be expected that actual damage would equal the compensation paid and, according to MCIC figures, this is the situation that exists. However, if producer estimates of actual damage are compared to the MCIC figures, producer estimates are double (100% greater) MCIC estimates. It is beyond the scope of this study to determine whether producer estimates or MCIC estimates show the greatest degree of accuracy. It seems strange, however, that the two estimates exhibit this degree of dispersion in the one area and not in the others.

It should be noted that there are a number of difficulties involved in estimating actual damage that occurs. Producers tended to respond to

this question by giving a range within which they believed the actual value fell. For the purposes of this study, the average of the range was taken as the value of actual damage to the crops. The figures obtained were somewhat disappointing in their uncertainty but this was understandable and, to some extent, expected. In certain circumstances the producer may not be aware that waterfowl have been feeding in the swaths until combining commences. As the producer will have difficulty determining the actual values, so too will the MCIC adjustors. They will also be prone to estimating only what is clearly visible. The producer has a slight edge insofar that he works with the grain and can estimate his losses as he combines, however, his valuation is subjective and prone to error. Despite the inaccuracies prevalent the data must be used because it is all that is available. The results of the analysis utilizing this data can be used with confidence if the limitations of the data are recognized.

Until 1979 the maximum coverage per acre was set at \$25. This maximum was raised for 1979 claims to \$50 per acre. It would be a worthwhile exercise to separate the collected data into two categories (prior and subsequent to \$50 per acre compensation). This would aid in the evaluation as to whether the increase in the level of compensation is merely in keeping with an increased value of agricultural crops or, if it is in fact, an increase in the level of payment. With only one year's data the results of such an analysis, at the present time, would be unusable.

Question 2 (continued)

	Area I -----	Area II -----	Area III -----	Total -----
C) Was settlement satisfactory				
a) yes	4	3	3	10
b) no	12	7	11	30
c) unsure	4	0	1	9
D) If No, Why				
a) Did not cover production costs	11	3	3	17
b) Did not cover market value	8	2	9	19
c) Appraised % damage inaccurate	3	2	5	10
d) Appraised yield estimates inaccurate	3	2	2	7
e) Other (specify)				
i) Does not consider trampling	0	2	0	2
ii) Cannot claim within 100 yards of road allowance	0	1	0	1
iii) Have to continually argue to receive anything	0	1	0	1
iv) Select seed of value \$4.50/bu., received only \$2.00/bu. for a total of \$375	0	1	0	1
v) Government birds, there- fore, when more than a few hundred dollars, should receive more back	0	0	1	1
E) Why did not file claim, if did not				
a) Amount of damage too small	10	2	8	20
b) Procedure too drawn out	1	0	1	1
c) Lack of information	3	0	1	4
d) Other (specify)				
i) For amount received, not worth it	1	1	1	3

Summary

Part C. Twenty-two percent (10 out of 45) were satisfied with coverage received.

Sixty-seven percent (30 out of 45) were not satisfied with coverage received.

Eleven percent (5 out of 45) were unsure, mainly because they seemed to feel that they were lucky to receive anything. However, comments made by four out of five of these individuals indicated that they thought it not unreasonable that they should receive more for their damaged grain.

In a number of responses a hesitancy existed to speak out against the program. This hesitancy may have been avoided if names and addresses had not been taken. Generally, the respondents seemed worried that any negative response made might come back to haunt them at some future date. This became evident in such comments as: "I'd better not say that," "Now don't write that down", "I won't repeat that," etc.

The distribution of negative and positive responses to this question was not significantly different between regions.

Part D. In total, 24 individuals (53%) indicated that the reason for dissatisfaction with the Compensation Program was because the amounts received did not cover the full market value of the damaged grain, or did not cover the cost of production. There were 36 responses given to these two reasons which indicated that some individuals responded positively to both.

The single major reason for dissatisfaction was because compensation did not cover the full market value of the grain (19 out of 45 responded

thusly). In a later section of the questionnaire, the same individuals were asked the level of compensation they considered equitable. This time, 30 out of 45 indicated that compensation should approach 100 percent the market value of damaged grain. The two questions asked the same thing and should have been a counter check against one another, however, more individuals responded positively to the "full market value concept" when asked about compensation levels directly. This may have been due to extrapolation from one method of presentation to another, or it may have been because some individuals feel 100 percent compensation is their due for other reasons than that they expect full market value. For example, they may desire 100 percent compensation to pay for inconvenience, prevention costs, or additional harvesting costs caused by waterfowl being present upon their property.

A further 10 individuals (22%) were dissatisfied with the appraisal procedure; either because the percentage damage or the appraised yield per acre was inaccurately determined. They did not blame the adjustors for these inaccuracies, but rather the procedures or policies that the adjustors were required to follow.

The remainder of those sampled complained that, because of the nature of the damage, a spot here and there, they could not claim. In order to receive compensation it is necessary to have a minimum amount of damage (5 percent of the field) in one area. They also complained that if a field was completely destroyed the method used to determine the yield per acre was to assess the yield on the closest field planted to the same crop by the same producer. The complaint was that this frequently meant that yields were underestimated. They did not mention the possibility that, in a similar fashion yields could be overestimated.

Part E. The major reason claims were not made was because the damage in any one field or region of the field was too small. This refers to the reason stated above that a claim cannot be made in the circumstance that an area damaged is less than a certain value (5 percent damage or a total claim value of less than 100 dollars).

Area Analysis. The analysis, if carried out for each individual area surveyed, would exhibit the same results as those stated above. All areas were consistent in the belief that the compensation settlements were unsatisfactory. Area II was more dissatisfied with the assessment procedure than either Area I or Area III. This area was theoretically receiving 100 percent compensation, however, opinion within the area was to the effect that because of the assessment procedure this was untrue. Their primary complaint was that only consumed grain was assessed whereas most damage was a result of trampling by waterfowl during the feeding process.

The major reasons claims were not made in Areas' I and III was because damage was too small, however, in Area II this problem did not appear to arise as often. This is hypothesized to be a result of the large number of waterfowl that congregate in the area. Migratory waterfowl do not land in small enough areas for damage to be so small that a claim would not be worthwhile.

Question 3

	Area I	Area II	Area III	Total
	-----	-----	-----	-----
Do waterfowl inflict costs above those directly involved in crop loss?				
a) yes	10	10	13	42
b) no	1	0	2	3
If yes, what form do they take?				
i) Prevention costs (equipment)	1	1	0	2
ii) Time costs (labour)	9	0	1	10
iii) Extra tillage due to trampled grain sprouting in spring	7	0	4	11
iv) Additional weed control	1	0	1	2
v) Time involved controlling hunting on property	5	1	0	6
vi) Greater harvesting costs	12	10	7	29
vii) Reduced quality of harvest due to manure, soil, etc.	15	8	11	34
viii) Other (specify)				
a) Pack soil so that in spring is difficult to work	0	1	0	1
b) When 100% loss, do not combine and therefore difficult to incorporate into the soil	0	1	0	1
c) Do not assess for trampled grain which is an additional cost	0	0	2	2

Summary

Out of 45 producers interviewed, three were of the opinion that there were no additional costs associated with migratory waterfowl crop damage, while 42 claimed the reverse. Twenty-nine of the 45 producers claimed that these costs took the form of extra harvesting costs, especially when grain was trampled and machinery was worked harder and longer. More time and labour became involved in harvesting and wear and tear on the machinery was greater.

Thirty-four of the 45 producers claimed that costs were incurred because of inferior quality of grain harvested due to the presence of mud and manure. Recoverable grain received less than the grade it would have received if the birds had not been present.

Fourteen of the 45 claimed that extra tillage was necessary because of trampled grain sprouting in the spring and, because of the necessity to cultivate straw into the soil when the crop is destroyed beyond the point where it is worth combining. If the grain is not combined it remains in windrows as opposed to being spread throughout the field. This creates extra costs because of equipment wear and tear, time and labour, and opportunity costs of carrying out these activities.

Ten of the 45 producers claimed that extra labour costs were involved because of prevention measures undertaken and extra time spent cultivating and/or harvesting.

Six of the 45 producers claimed that regulation of hunting was an extra cost.

Two of the 45 producers claimed extra weed control was a problem.

Two of the 45 producers claimed extra cost of prevention existed.

Area Analysis. All three areas agreed that additional costs besides those associated with actual crop losses were incurred by the producer. Area I drew greater attention to the costs of additional labour and tillage than did Areas' II and III. All three areas agreed higher harvesting costs were incurred and, that quality of production was greatly decreased because of birds trampling the grain into the soil and otherwise fouling it.

None of the individuals surveyed were able to attach actual dollar values to these costs. Any such attempts would have been subjective and little confidence could have been placed in the results.

Question 4

	<u>Area I</u>	<u>Area II</u>	<u>Area III</u>	<u>Total</u>
What in your opinion would be an equitable level of compensation?				
a) 80-100 percent	17	8	12	37
b) 50-80 percent	1	1	1	3
c) Less than 50 percent	0	0	0	0
d) Cover production costs	0	0	1	1
e) Other (specify)				
i) \$75/acre	1	0	0	1
ii) No answer	1	0	0	1
iii) Greater than now	0	1	1	2

Question 4

Producer	Level	Factors
1	\$75/acre	Correlated to actual crop loss.
2	100% Crop Value	Cover full crop damage because of high cost of inputs.
3	100% Crop Value	Out to make money, not merely to exist.
4	100% Crop Value	
5	100% Crop Value	Hunters receive benefits of protected birds while producers pay the costs.
6	No response	
7	100% Crop Value	Computed by determining yield in remainder of field or by yield of adjoining field of the same crop.
8	100% Crop Value	Producers out to make profit, not just to cover production costs.
9	What Can Get	Lucky to get anything. Why should government be responsible since they can't help it?
10	80% Crop Value	Do not want to feed government birds.
11	80% Crop Value	Should get greater than production cost because relying on that income.
12	100% Crop Value	No Comment.
13	80% Crop Value	Can always pick up something so should not be 100%.
14	100% Crop Value	Takes time to chase birds, etc.
15	100% Crop Value	Cannot appraise one crop from another. Should be appraised where birds are. Appraise each individual producer on each individual field.
16	80-100% Crop Value	Out to make a living and need to make more than just covering costs.
17	> 75% Crop Value	Cover at least cost of production. Not 100% because can always salvage something.
18	2/3 Crop Value	Not necessarily full value.
19	100% Crop Value	Producer should receive what crops worth in order to pay bills.
20	80-100% Crop Value	Producers can't exist just covering costs. Need more to expand.
21	75% Crop Value	Just covering production costs not enough. Never receive 100% for anything, so can't expect it.

<u>Producer</u>	<u>Level</u>	<u>Factors</u>
22	100% Crop Value	\$50/acre covers only input costs and gives no remuneration.
23	100% Crop Value	If field ruined then have lost everything could have made off it.
24	100% Crop Value	No say in waterfowl control. Not allowed to kill except in season. Is person's livelihood.
25	100% Crop Value	Although say are receiving 100% now, are not actually receiving that because cannot account for spot-losses that do not show up except when combining.
26	100% Crop Value	No complaints.
27	100% Crop Value	Adjustors not given freedom to adjust crops as want to. Always makes sure to pick worst areas and adjust as low as possible. Maybe two adjustors, one for each side.
28	100% or >	100% not really 100% because full damage is not found, so have > loss than get credit for. In areas out of OH should also receive 100%, especially if not their fault damage was done.
29	100% Crop Value	\$50/acre low considering costs of inputs.
30	> than now receiving	Geese hit same field every year. People and game warden driving over fields.
31	100% Crop Value	Write off trampled grain as well as consumed grain.
32	100% Crop Value	Government birds, benefits of selling hunting licenses and individual producer cannot scare.
33	100% Crop Value	Should receive this amount.
34	100% Crop Value	Now is just peanuts.
35	80-100% Crop Value	Anything less doesn't give much incentive to farm. Maybe not 100% because still get something off fields.
36	100% Crop Value	Government birds. Are protected from hunting and, therefore, shouldn't leave individual producer the responsibility for taking care of them.
37	Cover prod'n Cost	Producer can't grow crops for nothing.

<u>Producer</u>	<u>Level</u>	<u>Factors</u>
38	100% Crop Value	Government birds and should feed them.
39	Greater than now	Not exactly sure how much.
40	90% Crop Value	Can salvage something from field but should receive total value for damage.
41	100% Crop Value	Gov't should pay because is their birds. Or an accurately appraised value of crop damage, because don't feel should have to bear costs of feeding and housing these birds.
42	100% Crop Value	Don't want birds but not allowed to get rid of them.
43	75-80% Crop Value	Can always pick up something off fields.
44	80-90% Crop Value	Don't mind contributing something but majority should be paid by government.
45	100% Crop Value	Gov't birds and don't feel should have to feed them.

Summary

Out of 45 individuals interviewed, all believed (regardless of the region) that coverage for waterfowl damage to crops should be much higher. The general concensus indicated that the preferred level of coverage would center around 100 percent compensation.

The reasons given for this ranged from; these are government protected birds, and since individual producers cannot protect their crops from them, the government should pay for the damage they cause. The other major comment was that a producer should receive more than just production costs because he is in the business to make a profit in order to reinvest and expand his operation, as well as to meet his everyday operating costs.

Analysis by Area.

When the results of the question are presented in this format, it can be seen that 37 out of 45 individuals interviewed favoured higher compensation levels (approaching 100 percent). Thirty of the 37 explicitly stated 100 percent compensation whereas the other seven indicated a range of between 80 and 100 percent.

The results were the same when analyzed by area.

	Area I -----	Area II -----	Area III -----	Total -----
a) 80-100%	85%	80%	80%	82%
b) 50-80%	5%	10%	7%	7%
c) Less than 50%	0%	0%	0%	0%
d) Other (specify)				
i) \$75/acre	5%	0%	0%	2%
ii) No answer	5%	0%	0%	2%
iii) Greater than now	0%	10%	6%	5%

Between 80 and 85 percent of those surveyed, both within and between areas, called for greater than 80 percent compensation. There was no significant difference between regions.

Part B: PreventionQuestion 1

	<u>Area I</u>	<u>Area II</u>	<u>Area III</u>	<u>Total</u>
Have you undertaken prevention measures?				
i) yes	12	7	11	30
ii) no	8	3	4	15
A) If yes, which method was used?				
a) scarecrows	9	4	10	23
b) scare permits	7	2	5	14
c) zon bangers	8	6	11	25
d) change crops grown	3	0	0	3
e) other (specify)				
i) Drive truck in field	1	2	0	3
ii) Contacted hunters to hunt on property	0	0	1	1
B) State costs of initial purchase of equipment.	(Received no values here as in many cases were no initial costs. Much of material supplied by game warden at no charge, or else had no significant value attached as in the case of scarecrows, driving, and shooting.)			
C) Estimated time spent in prevention activities: (hrs./year) average.	14	20	15	
	(Not a good response to this question as could not give estimates of time spent. Too many factors involved so that time varied from year to year. No confidence placed in these values.)			
D) How effective were measures taken?				
a) worthwhile (>50% crop loss reduction)	12	4	12	28
b) not worthwhile (<50% crop loss reduction)	8	4	0	12
c) should be government responsibility	0	2	0	2
d) did not expect damage	0	0	3	3

Summary

Thirty out of 45 individuals had undertaken preventive measures (approximately 67% of the population sampled). The major methods employed were bangers (25), scarecrows (23), and scare permits (14). The other methods mentioned were not significant.

There were, however, significant differences between areas in the preventive methods used. In Area I, only 60 percent of those sampled undertook preventive action; in Area II, this increased to 70 percent; and in Area III to 73 percent. Bangers were the preferred scaring device in all areas with scarecrows running a close second. The only exception was Area I where scarecrows were more commonly used than bangers.

The costs incurred by the producer were miniscule for these activities throughout the area studied. The producers major input was labour and the time spent in prevention activities. Little confidence can be placed in the values obtained here, as the producer could only offer estimates as to the actual time involved. There are enough factors involved that the time can vary drastically between years. There was also a failure by many to recognize what exactly should be included in this category. Other problems involved: time spent is broken down into 15 minutes at one time, one hour at a later time, and another 15 minutes later on; the inconvenience involved in interrupting other activities to carry out the prevention activities; and many members of a family would be involved in scaring so that no one would know exactly how much time another member had been involved.

When attempting to analyze the effectiveness of the Prevention Program, it was noted that those who undertook prevention felt that it reduced crop losses to a worthwhile extent while those who did not take such action did not do so because they felt that it would make no appreciable difference to the level of crop damage. This was the trend for all areas, with the exception of Area II, where only one-half of those who undertook preventive actions felt that they were effective. The reason for this can be attributed once more to the large number of waterfowl that fly out from Oak Hammock Marsh to feed in the surrounding area. The large numbers are prohibitive in attempting to scare, as a person would be required to exert constant vigilance and immediate action at all times. Even if possible, this would not guarantee that the action would be effective.

Question 2

	<u>Area I</u>	<u>Area II</u>	<u>Area III</u>	<u>Total</u>
Have prevention programs been implemented by other sources?				
i) yes	12	9	15	36
ii) no	8	1	0	9
A) If yes, what form				
a) lure crops	3	8	0	11
b) baiting stations	0	1	0	1
c) hazing	0	8	0	8
d) zon bangers	12	9	14	34
e) cracker shells	1	4	10	15
f) other (specify)				
i) scarecrows	0	2	3	5
B) Were these programs effective?				
a) effective	4	3	11	18
b) undecided	1	0	1	2
c) not effective	7	6	3	16

Summary

Only nine out of 45 producers interviewed were unaware of any prevention programs being undertaken by government agencies within their particular area. The major methods that the remaining 36 individuals were aware of consisted of zon bangers and cracker shells. This was especially true in Areas' I and III. In Area II, both lure crops and hazing were known to be carried out around the Oak Hammock Wildlife Management Area.

Fifteen of the 45 producers interviewed believed that the prevention activities were ineffective. This belief was greater in Areas' I and II. Six of the fifteen were from Area II where the total sample consisted of 10 individuals. The high negative response from this area can be explained by the severity of crop damage incurred there. It is hypothesized that the bird population is too large to control with the methods presently in existence.

Question 3

	<u>Area I</u>	<u>Area II</u>	<u>Area III</u>	<u>Total</u>
In your opinion do you feel				
A) Government involvement in prevention should be greater?				
i) yes	17	9	13	39
ii) no	3	1	2	6
B) Individual producers involvement in prevention should be greater?				
i) yes	9	0	6	15
ii) no	11	10	9	30
C) Both government and individual should be involved?	6	0	6	12

Summary

Twenty-seven out of 45 individuals believed that the government should increase the extent of its prevention activities while producers should not be required to do the same. The general belief was that the government should take responsibility for their birds, whereas producers do not have the time, capacity, or know how to carry out effective action.

Twelve out of 45 individuals believed that both the government and producers should do more to prevent damage.

In total, 39 individuals believed the government should be more involved in damage prevention activities.

The remaining six individuals interviewed believed that the government could not do more, three believed producers could do more, and three believed producers could not.

The response did not vary between areas. All areas agreed in principle that prevention should be in the hands of the government as opposed to in the hands of the individual producer.

Question 4

	Area I	Area II	Area III	Total
	-----	-----	-----	-----
To prevent waterfowl damage, have alternate farming practices been attempted?				
i) yes	14	6	8	28
ii) no	6	4	7	17
If yes, what form did these take				
a) substitute less susceptible crops	12	6	7	25
b) altering harvesting patterns	6	0	3	9
c) growing more forage crops	4	2	1	7
d) draining wetlands	3	1	5	9
e) other (specify)				
i) purchased bigger machinery to harvest grain more quickly	0	1	0	1

Summary

Seventeen of the 45 individuals did not attempt alternate farming practices. The reasons for this frequently concerned the particular climatic, geographical, or geological characteristics of the area which made many alternate practices infeasible.

Of the 28 who did attempt to alter farming practices: twenty-four grew the less susceptible crops of flax and rape; nine altered harvesting procedures; nine drained wetlands to eliminate waterfowl habitat; and seven grew more forage crops. The producers frequently attempted more than one of the aforementioned alternatives.

There was no difference in the response between areas. All areas tried the same preventive tactics, including wetland drainage. This may have been expected to be carried out to a greater extent in the Pothole Country but it must be remembered that the Interlake contains a large amount of wetland also.

Question 5

	Area I	Area II	Area III	Total
	-----	-----	-----	-----
Would you be willing to undertake preventive measures at some future date?				
i) yes	20	6	11	37
ii) no	0	4	4	8
If no, what incentives would be required to induce participation?				
a) compensate prevention costs	7	0	0	7
b) greater availability of equipment for rent or purchase	3	0	0	3
c) greater availability of government provided equipment	8	1	1	10
d) less compensation for damaged crops	1	0	0	1
e) other (specify)				
i) not government responsibility	0	5	3	8

Summary

Thirty-one of the 45 individuals were willing to employ greater preventive measures while 13 believed that they should not be required to do so because it was the government's responsibility. Six out of the above 13 were from the Oak Hammock Marsh Area (Area II). Area I and Area III producers exhibited a greater incentive to increase prevention measures than did Area II producers. This emphasizes Area II's dissatisfaction with the government's development and management of the marsh, at what they feel to be their expense.

Part B: Insurance

	<u>Area I</u>	<u>Area II</u>	<u>Area III</u>	<u>Total</u>
1. Are you presently covered by crop insurance?				
i) yes	13	6	10	29
ii) no	7	4	5	16
2. Were you aware that waterfowl damage was covered as a natural hazard under crop insurance?				
i) yes	6	2	1	9
ii) no	14	8	14	36
3. Is coverage under crop insurance adequate for losses on your farm, which are caused by waterfowl?				
i) yes	1	0	0	1
ii) no	19	10	15	44
4. Incorporation of waterfowl crop damage as a spot-loss option is a good idea.				
i) agree	16	6	13	35
ii) undecided	3	0	2	5
iii) disagree	1	4	0	5
5. Would you be willing to pay premiums for this coverage?				
i) yes	10	5	13	28
ii) no	10	5	2	17
6. Insurance coverage for waterfowl should cover only costs of production.				
i) agree	2	0	0	2
ii) undecided	0	0	0	0
iii) disagree	18	10	15	33
7. Premiums should be subsidized by government.				
i) agree	16	9	9	34
ii) undecided	0	1	4	5
iii) disagree	4	0	2	0

	<u>Area I</u>	<u>Area II</u>	<u>Area III</u>	<u>Total</u>
9. Crop insurance as spot-loss coverage is the best alternative to the present compensation program.				
i) agree	9	3	11	23
ii) undecided	8	3	4	15
iii) disagree	3	4	0	7

Summary: Questions 1 through 5

Twenty-nine out of the 45 individuals were covered by Manitoba Crop Insurance.

Nine out of the 45 individuals were aware waterfowl pest losses were a natural hazard covered by the all-risk contract of crop insurance, similar to other hazards.

Forty-four out of the 45 individuals were not satisfied with the amount of coverage offered through crop insurance.

Thirty-five out of the 45 individuals thought spot-loss insurance could be a good idea, 5 were undecided, and 5 were against the idea.

Twenty-eight out of the 45 individuals were willing to pay premiums for coverage while 17 were not. This was because they felt it was not up to them to have to do so. The government developed the sanctuaries, protected the waterfowl; therefore, should pay the costs.

There was a wait and see attitude among many of those who agreed that a spot-loss insurance program was a good idea. This is why the "could be a good idea" response is emphasized. There was a willingness to participate but only if certain standards were met. Those interviewed indicated that they felt this would not be the case.

On a regional basis, there was a higher negative response (40%) from Area II than Area I (5%) and from Area III (0%). This is a highly significant difference. On the question of willingness to pay premiums, Area III showed a more positive reaction than the others but, all areas agreed that coverage should be greater than the basic costs of production (75%).

Summary: Questions 6 through 8

The inclination was towards higher coverage (approaching 100% crop value).

Thirty-six of the 45 individuals agreed that spot-loss insurance coverage premiums should be paid entirely, or at least subsidized, by the government.

Twenty-three of the 45 individuals agreed that spot-loss insurance coverage was a good idea. Fifteen were undecided and wanted to see how the program was to be administered before any decision would be made about how effective the idea was.

The only variability that occurred between the three areas in their response to this section was for question 8. There was a greater negative response in Area II to the proposal that spot-loss crop insurance coverage was the best alternative to the Compensation Program.

General Notes

--Many reports were given of producers who did not make claims even though they suffer frequent and sometimes extensive damage. The reasons indicated for not making claims consisted mainly of the following:

1. areas damaged were too small to claim even though they were persistently damaged;
2. many producers cannot be bothered with the claim procedure; and,
3. many felt that the birds must be fed and, if damage was neither too extensive or too frequent, they were willing to accomodate.

There is still, to some degree, a lack of awareness that a Compensation Program for this type of damage exists.

--Damage by hunters was a frequent complaint in the Interlake Regions of Bifrost and Fisher Branch. Damage can be quite extensive, taking the form of trampled swaths, holes in fields which cause harm to machinery if it happens to fall into them, scaring producers' families with guns, and shooting farm animals and machinery. The hunters, in general, show little respect for private property. In the controlled hunting area around Oak Hammock Marsh there were very few complaints concerning hunters. This was due to the requirement that hunters must register in advance and sign both in and out on the day they are hunting in the area. This gives the hunting population less anonymity and less thoughtless activity occurs as a result. The Northwest Region exhibited less animosity towards hunters than the Interlake Area but, more animosity than the Oak Hammock Area. The number of hunters in this area is not as large because of the greater distance from a major urban centre. The hunters hunting in the area tend to be local in nature and rural orient-

ed and appear to have a greater respect for private property. There was a general trend to entice more hunters to come into the area.

--Many individuals made note of the fact that birds appeared to hit the same fields year after year, as though there were particular areas they preferred or became accustomed to.

--Producers in the Oak Hammock area complained of increased weed control problems because of poor weed control practices at the marsh.

--Complaints were made with regard to the lack of speed and efficiency of government game wardens in placing bangers in producer's fields when requests were made. This led to the further complaint that the Prevention Program was uncoordinated and lacked sufficient equipment to be completely utile.

--There was general dissatisfaction with regard to the amount of time required to receive actual payments through the Compensation Program. Payments are seldom received prior to spring following the fall that damage occurs.

--Many individuals feel that the flight patterns of migratory waterfowl have been altered because of the creation of Oak Hammock Marsh. Oak Hammock receives a greater number of waterfowl which remain for a longer period of time in the fall. The Interlake may receive the same number as previously, but they remain for a shorter period of time and do less damage while there.

--There was some belief among residents that a longer hunting season would reduce waterfowl crop depredation because of the increased hunting pressure. There was also an indication that higher hunting license fees should be implemented in order that hunters bear a greater portion of the costs associated with migratory waterfowl preservation.

Prevention

--It was noted that scaring activities, if handled improperly, can actually worsen crop damage by spreading the birds throughout the field. It is frequently the best policy for an amateur to leave the birds alone and allow those with experience in the use of scare devices to deal with the situation.

--Geese are much easier to scare than ducks. Ducks scare for a short time, but will eventually become accustomed to the noise and the scarecrows and return to the field of grain.

--There was a strong belief that a producer should have the right to shoot waterfowl on his own property in order to scare them away.

--Producers were of the opinion that in abnormal years (a large number of waterfowl present) their own scaring activities (scarecrows, driving among birds) leaving equipment in fields, were ineffectual. In such years (a large numbers of birds remaining for a longer period of time because of favourable weather conditions) prevention methods, overall, were of little use.

Crop Insurance

As was indicated in the survey, 35 out of 45 (78%) of those questioned felt that a spot-loss insurance option for waterfowl damage was a good idea. Out of these 35 individuals, 28 indicated a willingness to pay insurance premiums (80% of those in agreement that a spot-loss option was a good idea, or 62% of the total population sampled). These figures are somewhat misleading as they deal with a hypothetical program proposal. One producer summed up the general feelings of a large portion of the population with the comment, "It may be the best alternative to a compensation program but it is not a recommended alternative." The question was answered in the context that no Compensation Program would be in existence.

Comments were made throughout the surveyed sample which cast doubt upon the agreeability of producers towards this type of program. The thirty-five agreeing that the program was a good idea accompanied this with a comment beginning with an "if" or a "but". All 45 were concerned with some of the following issues with regard to coverage and premium payments.

1. Coverage

--Coverage should be sufficiently high that it covers the value of the crop destroyed, otherwise, it would not be worthwhile to take out such coverage. Presently, under crop insurance, coverage is so low that it is not worthwhile to purchase. (Crop insurance replaces the out of pocket production expenses but does not cover the average yield or the profit level of production.)

--It should be a requirement that adjustments be made for the particular field that is destroyed. Average yield figures from other fields should not be used as an estimate for the field that is destroyed.

--To just cover production costs is not an equitable solution because the small producer would be the greatest sufferer, as he requires his profit margin to meet payments falling due. The large producer has other means to raise capital to tide him over. The small producer is less likely able to make premium payments.

--Producers would have a greater incentive to claim for small losses of five or six acres than they presently do under the existing program. Therefore, a more realistic assessment of actual damage would be available.

--Coverage should have a percent value rather than a dollar per acre value as a maximum, otherwise, more efficient producers and/or those with better land who have higher yields, would not be equitably treated.

Manitoba Crop Insurance coverage and administration procedures have turned a large number of producers off of this type of program, therefore, many who agree in principle are unwilling to become involved.

2. Premiums

--Premiums should be government subsidized because the government is responsible for waterfowl population maintenance. Everyone benefits from waterfowl and should pay for their preservation through the taxation process. Producers should not bear the full expense of maintaining these animals. Hunters should not benefit at the expense of producers but should be made to pay their share.

--Producers pay enough through the crop damage they incur for which no remuneration is received.

--Producers feel that they would probably end up paying through taxation anyway.

--The willingness of producers to pay premiums depended upon the extent of coverage being offered. If coverage is not worth much or, if there is a chance that they are going to be thwarted in some other fashion, there is no sense in paying premiums.

--Whether the producer pays premiums or not should depend upon whether the land was purchased with the knowledge that such dangers existed at the time. Oak Hammock residents were inclined toward the belief that they should not be responsible for any costs associated with waterfowl, including premium payments, because the Marsh was established subsequent to land purchases.

3. Other Comments

--Spot-loss insurance coverage should be separate from crop insurance because many people bothered by waterfowl are not willing to become involved with the regular crop insurance program (handled through separate program and hopefully through a separate agency).

--The administration and functioning of the program will make a difference to the individual's decision with regard to whether he will pay premiums or if, in fact, he would make use of the program at all (the flexibility to handle individual situations was deemed by producers to be a prerequisite of good administration).

--The acceptability of the program is dependent upon whether the program functions in a fashion that is worthwhile to the producer. If the hassle is considered too great, then it is not worth it.

APPENDIX B

MANITOBA CROP INSURANCE ACT

SECTION 24

SPOT-LOSS HAIL INSURANCE COVERAGE

SECTION 24

24. The following terms and conditions shall apply to hail spot-loss option coverage hereunder in addition to all applicable terms and conditions hereof:

(a) Hail spot-loss damage is defined as that portion of an insured crop hereunder damaged by hail and/or fire in any crop year.

(b) Coverage per acre under the hail spot-loss option shall be limited to the amount of all-risk coverage per acre as determined from the seeded acreage report for each crop insured hereunder and the continuing dollar coverage thereof during the crop year shall be reduced by any amount payable for hail and/or fire spot-loss damage.

(c) Total indemnity payments for damage under the hail spot-loss option coverage and under the other provisions hereof cannot exceed the all-risk coverage for each insured crop.

(d) Discounts other than for cash shall not apply to the premium for the hail spot-loss option coverage and indemnities paid under such option will not affect experience discounts which apply to the basic all-risk contract; nor will they affect the all-risk coverage adjustment factor.

(e) Coverage under the hail spot-loss option shall remain in force and effect only until noon of the 1st day of October in the crop year for which coverage applies.

(f) If all or part of a crop has been destroyed by a natural hazard covered by all-risk coverage other than hail and/or fire, the hail spot-loss coverage may be terminated on request of the Insured effective immediately following receipt of written notice by the Agency that such crop has been destroyed by cultivation, pasturing or other means. Un-earned hail spot-loss damage premium on such acreage shall be credited by the Agency to the Insured in accordance with the prescribed hail spot-loss option short-date cancellation table.

(g) In the event of hail spot-loss damage to an insured crop by hail and/or fire while coverage under such option is in effect, the Insured shall give notice of loss in writing to the local Agency office, by registered mail, within three days of the occurrence causing the loss or damage, stating his contract number, the day and hour of the occurrence causing the loss or damage, the estimated acreage affected and the estimated extent of damage thereto.

(h) In the case of a landlord/tenant agreement, if the tenant has selected the hail spot-loss option, the landlord and tenant have coverage based on the crop sharing agreement if they both have coverage.

(i) If a claim is filed and the loss is adjusted and found to be less than five percent (5%), an adjustment fee of \$15.00 shall be payable by the Insured.

(j) No payment shall be made on the hail spot-loss option on that portion of the damaged acreage determined to be less than five percent (5%) of damage.

(k) No payment shall be made on the hail spot-loss option for any loss or damage caused by reason of a crop being over-ripe.

(1) If under the hail spot-loss option, damage by hail and/or fire occurs when a crop is standing, or is cut and ready for threshing, subject to proper notice of loss being given, the Insured may proceed to harvest, provided that representative strips of each damaged crop the full length of the field and no less than twelve feet in width are left for inspection and adjustment.

(m) Hail spot-loss option coverage with respect to that part of an insured crop which has been harvested shall cease following completion of harvest and the premium thereon shall be deemed to have been fully earned.

(n) Under the hail spot-loss option, if damage to an insured crop by reason of hail exceeds seventy percent (70%) on any acre or acres of crops insured, and additional award shall be made in the amount of the difference between the actual adjusted loss and seventy percent (70%) with a maximum award being allowed of ten percent (10%) of the loss adjusted with respect to the acres of crops so damaged, provided always that in no case shall the total award for spot-loss damage paid on any acre or acres of crops insured exceed the amount of insurance coverage applicable thereto.

(o) No amount shall be paid on the hail spot-loss option for damage caused to an insured crop by reason of frost or by reason of fire if such fire is kindled by the Insured, unless lawfully kindled and in compliance with all precautions required by law.