WETLAND RETENTION ON THE PRAIRIES

THROUGH PRIVATE LANDOWNER STEWARDSHIP

By

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ABSTRACT

Loss and degradation of wetlands across Canada's prairie pothole region in Canada is severe and accelerating as on-going intensification and expansion of the agricultural land base continues to exert pressure on the remaining wetland resource. Traditionally wetlands have been regarded as unexploited wastelands to be converted to more productive agricultural uses. Although wetlands are now recognized as providing vital functions of a hydrological, ecological and social nature which have economic and social value as well as intrinsic value, difficulties in quantifying these benefits, coupled with readily calculated and realized benefits from agricultural production, result in continuing wetland losses. As well, because wetland benefits accrue to the general public rather than the private land holders who dominate the pothole region, individual owners cannot capture payment for these benefits and thus favor agricultural production over wetland retention.

The primary objective of the thesis is to evaluate collective action nonregulatory approaches to fostering encouraging private landowner stewardship on the prairies with respect to wetland retention. From the literature, it is established that a nonregulatory approach to preserving wetlands on private lands is preferable to police power regulation from both a landowner and general public perspective. Several benefits associated with using nonregulatory tools to promote changes in landowner behavior are identified and developed into an analytical framework. Using this framework, six market and moral suasion nonregulatory tools commonly used to encourage landowners to retain wetlands are assessed for their apparent advantages and disadvantages in supporting the primary concerns of landowners faced with a decision whether

to enter into a stewardship program. From this assessment, conclusions regarding probable owner acceptability of the mechanisms are drawn, acceptability being a measure for how successful the nonregulatory tools will be in promoting private stewardship of wetlands.

The expected landowner appeal of the mechanisms is tested by evaluating their actual owner appeal as implemented in three on-going Canadian stewardship programs. Actual appeal is found to be fairly consistent with results from the literature analysis and conclusions from these results indicate that the mechanisms do vary in their effectiveness to encourage landowners to retain wetlands and thus vary in their ability to secure wetland acreage for protection. Data limitations are encountered in the case studies due to the infancy of stewardship programs in Canada and thus it is concluded that it will take time to demonstrate the effectiveness of nonregulatory mechanisms in promoting private landowner stewardship of wetlands.

The evaluation of nonregulatory tools allows a number of recommendations to be drawn with regard to improving stewardship programs in order to effectively encourage landowner participation, the type of data base that needs to be established in order to effectively monitor the success of nonregulatory mechanisms, and opportunities for further investigation in this area of study.

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1.1 Introduction

The prairie pothole region of Canada is undergoing a rapid transition from a mixture of pastures, wetlands, woodlands, and native grasslands, to cropland. Traditionally, wetlands have been regarded as unexploited wastelands, their perceived value dependent primarily on their potential conversion to more "productive" uses such as agricultural production. This view has led to a severe and accelerating loss of wetlands through indiscriminate drainage. In addition, farming practices such as cultivating, grazing and burning have degraded wetland margins, an essential component of wildlife habitat.

It has only been in the last decade that the value of wetland functions has been more widely recognized. In their natural state, wetlands provide hydrological, ecological and social functions vital to the well-being of Canadians. In addition to their importance to human-kind, wetland functions have intrinsic value, that is, value in and of themselves.

Efforts to protect Canada's wetland resource have been constrained for a number of reasons. The lack of coordination in wetland jurisdictional responsibility (spread among federal, provincial and municipal agencies), has significantly reduced the ability to develop a unified or long-term wetland management policy. As a result, conservation measures have largely been reactive, providing only ad hoc responses to threats of drainage and degradation for development purposes. Aside from coordination problems within legislative regimes, conflicting legislation, polices and programs have resulted in provincial and federal drainage and

agricultural intensification subsidy programs which often compete with conservation efforts.

In addition to institutional constraints, rational decisions regarding wetland use are hampered by socio-economic considerations. It has been difficult to measure many of the wetland benefits within our present system of resource allocation. Failure to quantify wetland benefits for comparison with alternative land uses makes it difficult to justify wetland retention. Immediate economic benefit can be more readily calculated and realized from agricultural production. As well, wetland benefits accrue to the public in general, and not exclusively to private landowners. As a result, private land use decisions based on personal costs and benefits favor economic development such as agricultural production over wetland conservation. This private economic consideration of wetland drainage versus retention is compounded in the prairie pothole region due to the high degree of private landownership (National Wetlands Working Group 1988).

Traditionally, protection of natural areas has been undertaken through land acquisition from private landowners or through a land use planning process which typically includes restrictive land use regulations. More recently, private organizations and government agencies have moved towards another approach to conservation, that of encouraging private land stewardship (Hilts and Moull 1988). Private land stewardship simply means taking good care of the land while it is used and suggests a concern for future generations and an ethical responsibility or obligation beyond the human community to include all other species and the land on which all depend (Hilts 1990). Retaining wetlands on the prairies through private

landowner stewardship involves working in cooperation with landowners to promote the responsible, wise use of the wetland resource.

1.2 Purpose and Overview

This thesis evaluates nonregulatory approaches to encouraging private landowner stewardship on the prairies with respect to wetland retention. To meet this end, first, a broad overview of the advantages and disadvantages of both regulatory and nonregulatory mechanisms is presented in the context of promoting stewardship of wetland environments on private land holdings. Next, six common nonregulatory mechanisms used to promote private stewardship of wetlands are analyzed. The purpose of the analysis is to indicate the probable acceptability of the nonregulatory mechanisms to landowners. This analysis is comparative in nature- assessing the apparent advantages and disadvantages of the mechanisms based on those concerns which are foremost in the landowner's mind when considering stewardship programs: 1) financial benefits to the landowner, 2) landowner control of property rights, and 3) design considerations of the mechanism such as flexibility and complexity.

Thirdly, the six nonregulatory mechanisms are evaluated for their success in promoting landowner stewardship of wetland environments. This evaluation is based on the existing landowner acceptability of the mechanisms as determined through a review of three stewardship programs from Alberta, Saskatchewan and Ontario. The Landowner Habitat Project (Alberta), Prairie Pothole Project (Saskatchewan), and Natural Heritage Stewardship Program (Ontario) utilize only nonregulatory mechanisms to encourage private stewardship of natural areas and lead the way in Canada in terms of length of time in operation and data generated. All have been

established in regions predominantly under private ownership and under increasing pressure from intensification of the agricultural land base and expanding nonagricultural uses such as urbanization. Although the Natural Heritage Stewardship Program is not within the prairie pothole region, it is considered an appropriate case study because landowners in the area in which this program is operational face the same socio-economic limitations as prairie farmers with regard to wetland retention and thus have the same concerns when considering stewardship programs.

To conclude this study, recommendations are made on how nonregulatory mechanisms and stewardship programs can be improved in order to effectively encourage landowner stewardship.

To assist the reader in understanding the wider problem context of wetland retention, the thesis begins by presenting a rationale for retaining wetlands followed by a discussion of the effects and causes of prairie wetland destruction.

1.3 Methodology

To evaluate the nonregulatory approaches to promoting landowner stewardship of wetlands, a descriptive, qualitative approach is taken. The use of nonregulatory mechanisms to encourage private stewardship is a new method for achieving conservation goals and as a result, quantitative research on this subject is limited. Only limited long-term data has been collected with regard to landowner participation in stewardship programs. As well, there is a lack of data on those factors that motivate landholders to participate in stewardship programs and on owner attitudes towards conservation before and after program participation.

There are two general nonregulatory approaches designed to induce individuals to alter their behavior: 1) the market approach and 2) moral suasion. Not all market and moral suasion mechanisms are suitable for promoting private stewardship of wetlands nor are all commonly mentioned in the literature or actually implemented through stewardship programs. Six mechanisms directly related to promoting wetland retention are analyzed and evaluated: market approach - 1) property tax incentives, 2) management agreements, 3) leases, 4) conservation easements; moral suasion - 5) landowner education, and 6) landowner recognition. The six reflect a general set of mechanisms that are mentioned regularly in the literature, and which appear to have some merit for promoting private stewardship of wetlands.

To carry out the comparative analysis of the six mechanisms, an analytical framework is developed. The framework is used to assess the apparent advantages and disadvantages of the mechanisms in supporting landowner concerns. Conclusions regarding probable owner acceptability of each mechanism are based on the results of this assessment. The framework is comprised of five general criteria judged to represent many of the primary concerns of landowners contemplating participation in a stewardship program. The criteria are: 1) strong economic incentives, 2) landowner control, 3) flexibility, 4) certainty, and 5) lack of complexity. Development of the framework is primarily based on a review of the literature pertaining to socio-economic causes of wetland drainage (Chapter II) and the advantages and disadvantages of regulatory and nonregulatory mechanisms (Chapter III).

The information for the comparative analysis of the six mechanisms is based on literature research. In carrying out the analysis, four broad

headings are used for each mechanism: 1) Description, 2) Advantages, 3) Disadvantages, and 4) Conclusion. To summarize the analysis, a matrix of the five criteria for each of the six mechanisms is assembled as well as a figure outlining the mechanism's probable landowner acceptability.

After analyzing the selected nonregulatory mechanisms, case studies of Alberta's Landowner Habitat Project, Saskatchewan's Prairie Pothole Project and Ontario's Natural Heritage Stewardship Program are undertaken in order to evaluate the success of the mechanisms in promoting private stewardship of wetlands. Success is measured by actual landowner acceptability of the mechanisms as implemented in the three case studies. Given the purpose of this thesis and case study data limitations, landowner participation is judged to be a good measure of acceptability and evaluation criteria are developed on that basis. The effectiveness of the mechanisms is assessed against the following four criteria: 1) actual rate of landowner participation, 2) length of participation as indicated by length of agreement the landowner entered into and number of agreements terminated before end of term, 3) rate of agreement compliance, and 4) positive shift in attitude towards wetland stewardship or conservation ethic. Limitations with regard to applying the criteria are encountered and will be outlined later.

The result of the analysis and evaluation is a set of recommendations for improving the nonregulatory mechanisms and establishing a data base to effectively monitor their success in promoting stewardship. Before proceeding, it is necessary to define "wetland" and the "prairie pothole region of Canada".

1.4 Definitions

1) Wetland - Conceptually, wetlands lie between well-drained terrestrial areas and permanently flooded deep waters of lakes, rivers and coastal areas. They can form in distinct depressions or basins that are readily observed or may occur in unapparent shallow depressions making the wetland-upland boundary difficult to identify. Historically, wetlands were defined by scientists working in specialized fields. As a result, various disciplines and professionals such as waterfowl managers and flood control engineers developed their own wetland definitions to meet their needs, leading to the absence of a standard definition in the literature (Tiner, Jr. 1984). The United States Fish and Wildlife Service (Cowardin 1982) took a multi-disciplinary approach in attempting to develop a complete, ecologically sound definition of wetlands. They define wetlands as follows:

> Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes; 2) the substrate is predominantly undrained hydric soil; and 3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season each year (Cowardin 1982, p83).

The definition given in Tarnocai (1979) for the Canadian Wetland Registry is similar:

> Wetland is defined as land having the water table at, near, or above the land surface or which is saturated for a long enough period to promote *wetland or aquatic processes* as indicated by hydric soils, hydrophylic vegetation and various kinds of biological activity which are adapted to the wet environment (Tarnocai 1979, p11).

Both definitions emphasize three key attributes of wetlands- the degree of flooding or soil saturation and the presence of wetland vegetation (hydrophytes) and/or hydric soils. All areas considered wetland must

capture enough water at some time during the growing season to put stress on animals and plants not adapted for life in water or saturated soils. This would exclude sheet wash which occurs on fields after snow melt and heavy rains or other temporary bodies of water not promoting aquatic processes. Permanently flooded deepwater areas generally deeper than six feet are not considered wetlands because water and not air is the principal medium in which the dominant organisms must live (Tiner, Jr. 1984).

2) Prairie pothole region of Canada - The prairie provinces of Alberta, Saskatchewan and Manitoba, covering nearly 2.0 million square kilometers, consist of grasslands, aspen parkland, and boreal and alpine forests (Wildlife Habitat Canada 1986). The southern portion of the prairie provinces, comprised of grassland and aspen parkland and occupying approximately 390,000 square kilometers, is the largest single expanse of arable land in Canada renowned for the production of grains and beef. This fertile area is also characterized by an abundance of shallow wetlands or potholes and is known as the prairie pothole region of Canada as indicated in Figure 1 (Lynch-Stewart 1983 and National Wetlands Working Group 1988). As a result of glaciation thousands of years ago, this region is pock-marked with millions of pothole depressions with the greatest number and variety occurring in hummocky moraine topography created by glacial stagnation. Although potholes range in size from a fraction of a hectare to several hundred hectares, most are relatively small in size. In Alberta for example, 59 percent of potholes are 0.04-0.42 hectares in size. Despite the small size of prairie potholes, their cumulative area covers a significant portion of the land surface. On hummocky moraines, wetland densities as high as 23-35 per section (259 hectares) have been observed.

Prairie potholes are shallow, usually less than 2 meters in deep; however, available water in potholes fluctuates widely both seasonally and annually due to differences in precipitation, water penetration, seepage inflow from groundwater, runoff, and the surrounding topography. Temporary potholes undergo seasonal changes, shifting from predominantly open water ponds in spring to drying basins covered by patchy or closed stands of vegetation in summer. Semi-permanent potholes persist throughout the year during seasons of average precipitation but dry out during drought conditions. Seasonal fluctuations in precipitation and prolonged periods of drought, characteristic of the prairies, can dramatically impact the water regime of semi-permanent wetlands. Semi-permanent and permanent potholes are defined by a predominant open pond bordered by a fringe of persistent emergents such as bulrush and cattail (National Wetlands Working Group 1988).

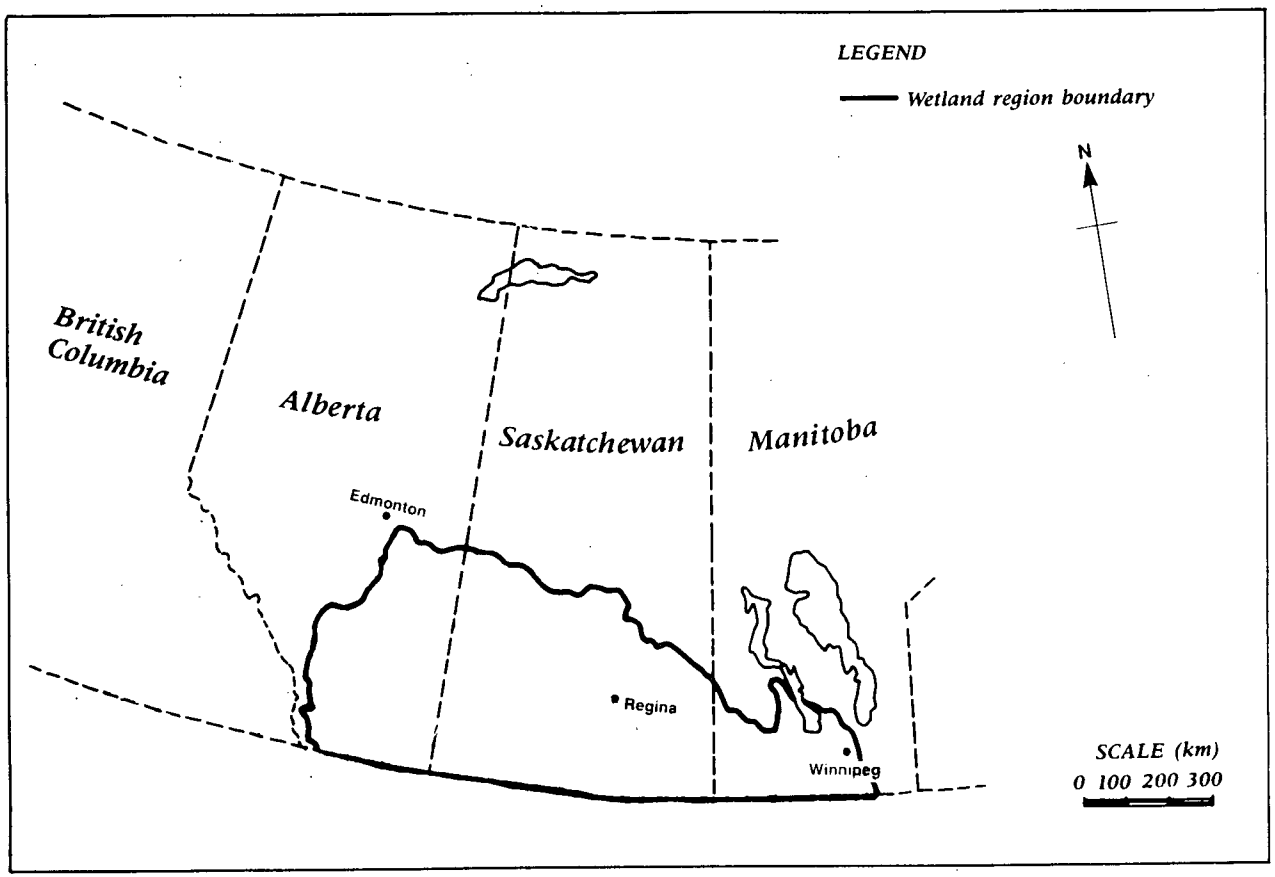


Figure 1. Prairie Pothole Region of Canada maps.

II. WETLAND RETENTION: RATIONALE AND PROBLEM CONTEXT

2.1 Introduction

Although the value of wetlands has been more widely recognized in the last decade, there still exists a lack of understanding about natural wetland functions and the importance and extent of those functions. For this reason, it is not appropriate to assume that wetlands must be conserved. Thus, a rational for preserving wetlands is developed in this chapter through a review of the relevant literature.

In addition to presenting a rationale for wetland retention, the effects and causes of prairie wetland destruction are examined through literature research. This will assist the reader in placing the specific problem being examined in the thesis into a broader problem context.

2.2 Why Preserve Wetlands?

The rationale for preserving prairie potholes begins with an outline of the many functions natural wetlands provide. Subsequent discussions focus on the irreversibility of lost wetland functions due to drainage and degradation, the economic, social and intrinsic value associated with wetland functions, and the role those functions play in achieving sustainable development.

2.2.1 Wetland Functions

Prairie wetlands in their natural state are an integral component of the prairie ecosystem providing hydrological and ecological functions. As well, they fulfill many social functions.

1) Hydrological Functions:

(a) Flood reduction - Pothole basins may collect and store water during floods and storms thereby reducing flood peaks.

(b) Erosion control - Peak flow reduction by wetlands limits erosion by slowing floodwater velocities.

(c) Water quality modification- Prairie wetlands are effective in improving water quality. The basins act as water purifiers, removing nutrients such as nitrogen and phosphorus, sediments and agricultural pollutants through filtration, sedimentation, anaerobic and aerobic decomposition, biological assimilation, and absorption by mineral and organic sediments (The Ontario Chapter, Soil Conservation Society of America 1987 and National Wetlands Working Group 1988).

(d) Ground water recharge and discharge - Potholes may intersect ground water flows so as to function as either recharge or discharge points (Odum 1978 and National Wetlands Working Group 1988).

2) Ecological Functions:

(a) Productivity and diversity - Although prairie potholes vary in size, depth, longevity, and vegetative composition, they are often highly productive, supporting complex food webs (Brace and Pepper 1984). According to Odum (1978), the high productivity of many wetlands is due to the positive effect of water flow. Water currents act as an auxiliary energy subsidy that circulates nutrients and waste products within the system allowing organisms to use more of their productive energy for growth. Seasonal fluctuations in precipitation, characterized by prolonged periods of drought, are a common and integral part of the prairies. The natural drawdown in prairie potholes increases the fertility of the pothole

soils with subsequent wet years witnessing an explosive nutrient release through vigorous growth of vegetation, invertebrates and other organisms (Lynch-Stewart 1983 and Cowan 1988).

The high productivity of wetlands supports a great diversity of flora and fauna. In addition to sustaining large and diverse communities of invertebrates and plants, prairie potholes provide food, escape cover and reproductive habitat for an array of terrestrial and aquatic wildlife species. About 45 species of waterfowl, 115 species of other birds, and 50 species of mammals such as deer, rabbit, muskrat and beaver utilize prairie wetlands for at least part of their life cycle (Brace and Pepper 1984 and Schmitt 1985).

The high density and variability of wetlands in the pothole region provide habitat for the production of approximately 50 percent of the North American waterfowl population (Lynch-Stewart 1983). Waterfowl are the most prominent and economically important group of migratory birds in North America. They are highly prized by millions of bird watchers and hunters, generating a direct expenditure in excess of several billions of dollars annually across North America (Canadian Wildlife Service 1986). The mosaic of wetland sizes and types typical of the prairie pothole region meet waterfowl needs including food, space, and habitat for nesting, brood-rearing, molting and staging. No one type or size of pothole can provide for all of these requirements. Shallow temporary ponds with surrounding native meadows and uplands are utilized by breeding pairs for nesting. These ponds are highly fertile providing a rich food source important to nesting ducks. Semipermanent wetlands subsequently provide food and shelter for broods. Larger permanent wetlands provide cover during the flightless molt period and act as fall staging areas allowing waterfowl to

rest and build up energy reserves in preparation for the fall migration (Brace and Pepper 1984 and Melinchuk 1988).

(b) Critical habitat - Wetlands provide critical habitat for rare and endangered species. Thirty five species of fish, birds, animals or plants which depend on wetland habitats have been classified as endangered by the Committee on the Status of Endangered Wildlife in Canada (National Wetlands Working Group 1988).

3) Social Functions:

(a) Education and research - Wetlands provide opportunities for educational nature observation and scientific research. They provide an excellent resource base for learning and research regarding ecosystem structure and functions.

(b) Aesthetics - The visual diversity and contrast provided by wetland landscapes enhance the quality of life by fulfilling human needs for open space and landscape variety (The Ontario Chapter, Soil Conservation Society of America 1987 and National Wetlands Working Group 1988).

(c) Recreation - Wetlands serve as recreation sites for hunters, naturalists, birdwatchers, hikers, photographers, and others with outdoor interests.

(d) Renewable resource products - Local and regional economies may directly reap economic and other benefits related to the harvest of renewable natural resources from wetlands. Game birds, wild rice and furs from muskrat and beaver are examples of the many resources provided by wetlands (National Wetlands Working Group 1988).

2.2.2 Irreversibility of Wetland Destruction

Wetland restoration and creation has been attempted as a means of mitigating for the adverse impacts of developing natural wetland environments. Restoration refers to returning a damaged or destroyed wetland to a former, normal, or unimpaired state. Creation refers to bringing a wetland into existence where it did not formerly exist through such means as filling, dredging, or water level manipulation (Kusler 1990). Success in terms of restoring or creating a wetland depends on the criteria for success.

> Development impacts ...may be reversible, if reversible is interpreted to mean restoration of part of the functions and structural content sufficient to permit resumption of for example, basic recreational activities (Turner 1988, p132).

Kusler (1990) points out that if success is based upon resumption of all functions found within a natural wetland environment, then it is probably not possible to successfully restore or create a wetland. Based upon limited studies, wetland scientists in general are in agreement that neither all natural wetland types nor all functions may be able to be duplicated or replicated exactly through either restoration or creation. Zedler (1987), supported by Kusler, contends that from a scientific perspective, much is still unknown regarding the functioning or long term processes of wetlands and how these environments change and react to internal and external stimuli. Much less is known about how to restore or create certain wetland types and functions. Natural wetland environments are extremely complex, dynamic ecosystems representing thousands of years of geologic and hydrologic processes with resultant accumulations of soil profiles and niches of plant and animal species. Most natural wetland

systems require a more or less continuous water supply, sediment balance, and periodic flooding or droughts to interrupt successional sequences.

According to Larson (1987) and Kusler (1990) efforts have been successful in terms of replacing wetland flood and sediment control functions, and manipulating vegetation, often by water level management, to produce productive wildlife habitat. However, evidence of performance for other functions is rare and Kusler reports that functions dependent upon hydrology and soils approximating the original wetland system may take thousands of years to be restored, and critical habitat for endangered species may never return. Kusler also reports that, in general, researchers have found that it is easier to restore certain types of coastal and estuarine wetlands than inland freshwater wetlands such as prairie potholes because the hydrology of coastal and estuarine wetlands is more easily determined and replicated and far fewer plant species live in these areas.

2.2.3 Economic and Social Value

The many diverse functions of wetland environments provide a variety of goods and services valued by people. These goods and services are valued because they provide basic life necessities and life-enriching or amenity services (Leitch and Shabman 1988).

The value of wetland goods and services to individuals and society can be economic or social. Economic values are generally associated with monetary gains that accrue to individuals who utilize wetland products or services for profit. Commercial furbearer trapping, wild rice harvesting, and water supply for crops or livestock represent potential sources of revenue from wetlands and thus have economic value. Social values deal

directly with the functioning of individuals or society and are associated with improving knowledge, survival, health, and lifestyle quality (Usher and Scarth 1988).

Brown and Manfredo (1987) identified four broad categories of social values: cultural, societal, psychological, and physiological. Cultural values focus on the ideas and thoughts that make up a culture. Societal values are those relating to social relationships among people such as family togetherness that might be fostered through shared participation in nature photography. Psychological values are related to the personal well being that one perceives from the object of value. For example, wetlands may be valued because studying them leads to learning more about the natural world or knowing that wetlands exist might provide satisfaction regarding one's responsibility to future generations. Physiological values are related to improving health and functioning of the human body. Subsistence communities, for example, may value wetland environments for their contribution to the communities' food requirements. As well, a value may be attached to wetlands because in the pursuit of wetland recreational activities it may be perceived that they are enhancing health through exercise and reduction of stress.

Brown and Manfredo's broad categorization of social values can be applied to the many functions provided by wetland environments. A result of this application is a number of specific, diverse social values associated with wetlands. As reported by Usher and Scarth (1988), individuals and society may value wetlands for the following: 1) consumptive recreation such as hunting; 2) non-consumptive recreation such as wildlife observation and camping; 3) aesthetics; 4) knowledge gained through education and research; 5) genetic diversity, and 6) environmental

benefits such as ground water recharge, and maintenance of water quality. Rolston, III (1981) suggests that natural systems such as wetlands can also be valued for their contribution to life support. The hydrologic and ecologic functions of wetlands contribute to environmental health and thus to the support of human life.

In addition, Phillips and Adamowicz (1986) indicate that there are social values associated with the non-use of natural environments including option, existence and bequest values. Option values arise from a desire to be able to use natural environments in the future. Regardless of whether or not the option to use a wetland is exercised, there is a value to maintaining wetlands so that they will be available for future use. Existence values arise from a desire to have natural environments continue to exist regardless of use or option values. Well being may be enhanced by knowing that wetlands will continue to exist in a given area apart from any desire to benefit personally from them now or in the future. Bequest values arise from the fact that people derive pleasure from the knowledge that a diverse and irreplaceable natural environment will be available for the enjoyment of future generations.

Within our present system of resource allocation, measurement of economic and social values associated with wetlands is needed in order to improve tradeoff decisions between wetland retention versus conversion to other uses. The scarcity of natural resources and resource services makes it impossible to satisfy all of our needs and desires; thus, social choices or tradeoffs must be made on how best to use the natural environment to improve social well being. Economic questions of resource use alternatives focus on comparing benefits and costs in a common denominator that may be money or some other numeraire (Phillips and Adamowicz 1986). The concept

of economic efficiency or Pareto optimality is at the core of this benefit-cost tradeoff analysis. An allocation of resources is Pareto optimal if it is impossible to better someone's condition without concurrently worsening another's, via reallocation. That is, the resource allocation renders the greatest net benefit to society (Davis and Kamien 1977).

To quantify the benefits and costs of wetland retention versus conversion to other uses, it is necessary to explicitly measure or quantify the economic and social values of wetlands. Many resource goods and services are allocated through the market mechanism. Market prices represent measures of resource values and thus function as rationing devices for resource commodities. Market prices ensue from buying and selling behavior of individuals and represent the worth of something to buyers and sellers at the margin- that is, what the last unit traded was worth to both buyer and seller. Economic values of wetlands such as commercial furbearing trapping have well-defined markets and thus are measured through directly observed market prices. However, many of the social values of wetlands such as wildlife observation do not have defined markets and thus cannot be quantified by the interaction of supply and demand forces in a market (Leitch and Shabman 1988). Quantifying social values for which no market prices exist is more commonly estimated by inferring what consumers would be willing to pay for the resource goods or services or what consumers are willing to accept as compensation to forgo the resource goods or services (Phillips 1983). Foster (1978) and Power (1985) point out that measurement of the nonmarket social values of wetlands can lead to much improved and supportable tradeoff decisions regarding wetland retention versus drainage. Valuation seeks to give explicit expression to social values which otherwise might be ignored or

misstated in resource allocation decisions because they are not commercial in nature.

Although willingness to pay (WTP) and willingness to accept compensation (WTAC) are commonly used economic tools to make resource allocation decisions, authors have recognized their differences and limitations in estimating social values of wetlands. According to Knetsch (1980), a growing number of studies are consistent in finding that people require greater compensation to forego their freedom to use or to have access to a resource such as wetlands than they are willing to pay to maintain the same right. Phillips (1983) suggests WTAC and WTP values can differ widely if an activity such as duck hunting is of significant importance to an individual and takes a significant portion of that individual's discretionary income. Asking someone how much they are willing to pay to hunt ducks depends, in part, on what they can afford. In contrast, when asking that same individual how much compensation they would accept to forego that activity, the income constraint is removed.

Regarding the limitations of WTP and WTAC, Leitch and Shabman (1988) argue that some social values of wetlands, such as duck hunting, are amenable to indirect valuation while others, such as landscape aesthetics, are much more speculative and difficult to quantify because such values are formed totally outside the scope of the marketplace. According to Muller (1985), a conceptual limitation of willingness to pay estimates is imposed by the fundamental irreversibility of wetland destruction. The willingness to pay for the preservation of wetlands will likely increase over time due to the declining supply of wetland environments coupled with the increasing demand for wetland goods and services as the population continues to grow and wetland functions become better understood. Consequently, today's

estimated quantification of wetland values is probably an underestimation of their future worth and thus irreversibly reallocating wetland areas to development uses may eventually impose costs greater than the benefits obtained.

Given the deficiencies associated with quantifying wetland values and the resultant negative impact on wetland management, Turner (1988) suggests the "safe minimum standard of conservation" concept be adopted. This concept takes social and natural uncertainty explicitly into account by avoiding irreversibilities in the loss of "critical zone resources" unless the social costs of doing so are unacceptably high. For example, a safe minimum population of an endangered wetland species should be maintained unless costs are very large- "very large" being defined through considerations of intergenerational equity and other ethical concerns, and economic analysis.

Despite the difficulties in measuring social wetland values, Jaworski (1981) and Danielson and Leitch (1986) report that several attempts have been made to quantify in monetary terms the social value of wetlands in addition to quantifying their economic value through market prices. Measuring wetland values in monetary terms provides the public with a standard basis of comparison (i.e., dollar values) for improved wetland allocation decisions. As cited by Jaworski, a study of wetlands in the Great Lakes region of Canada involved calculating the gross annual income per acre of wetland generated from sport fishing, non-consumptive recreation, waterfowl hunting, furbearer trapping, and commercial fishing. The researchers estimated that wetlands generated a gross return of 470 dollars per acre per year. In addition, researchers determining the 30 year cost of replacing various wetland functions estimated that the cost of

replacing the nutrient removal functions of a wetland to be 34,000 dollars per acre (1980 dollars). As cited by Danielson and Leitch, flood control values of wetlands in Massachusetts have been estimated to be as high as 80 dollars per acre per year, and total annual wetland social values have been estimated to range from 20 dollars per acre in New York to 4,070 dollars per acre in Louisiana.

In addition to research cited by Jaworski and Danielson and Leitch, Jacquemot et al. (1986), in a study to examine the importance of wildlife to Canadians, estimated the net worth residents of the provinces placed on their participation in wildlife-related activities during 1981. In Alberta, Saskatchewan and Manitoba, the total net worth of recreational hunting of waterfowl in wetland environments was estimated at 30.5 million dollars. As well, the British Columbia Ministry of Environment, Wildlife Branch (Renewable Resources Sub-Committee 1989) estimated that waterfowl hunters spent an average of 29 dollars per day and indicated that they would be willing to pay an additional 15.60 dollars for the experience.

2.2.4 Intrinsic Value

Economic and social values of natural environments dominate the thinking of Western society because of the prevailing attitude that natural environments are only useful as a means to an end- whether as a means to satisfy human spiritual needs, material needs or basic life necessities (Callicott 1987). Ehrenfeld (1978) argues that those species and communities that are not known to be useful to us, that is, lack an economic or social value or demonstrated potential value as natural resources, are considered worthless and thus tend to be ignored and eventually eliminated due to inadequate protection. This attitude towards

the natural world is anthropocentric or human-centered and is supported by the belief that humankind stands apart from nature in a position of superiority with dominion over all other forms of life, and that nature exists only to provide us with the raw materials necessary for life and a continuously expanding materialistic lifestyle (Chant 1986).

> From this human-centered standpoint it is to humans and only to humans that all duties are ultimately owed. We may have responsibilities *with regard to* the natural ecosystems and biotic communities of our planet, but these responsibilities are in every case based on the contingent fact that our treatment of those ecosystems and communities of life can further the realization of human values and/or human rights. We have no obligation to promote or protect the good of nonhuman living things, independently of this contingent fact (Taylor 1981, p198).

Although economic and social values are important to our society, they are not the only ones. All life on earth can be valued intrinsically, that is, as having value in and of itself and not merely for ulterior human purposes or ends. If something is said to have intrinsic value or inherent worth, it is understood that it is worthy of preservation and promotion as an end in itself (Hanson 1986). Proponents of deep ecology (Devall and Sessions 1985) argue that living entities have value in themselves independent of the usefulness of the nonhuman world for human purposes, and that humans have no right to reduce the richness and diversity of life except to fulfill vital needs. This attitude towards the natural world is based on the belief of biocentric equality. That is, all organisms and entities on earth are equal in intrinsic worth and have an equal right to live and to reach their own individual forms of unfolding and self-realization. Thus, humans are thought of as members of the Earth's community of life and retain that membership on the same terms as apply to all nonhuman members. The concept of biocentric equality is intimately

related to the belief that the totality of the earth's natural ecosystems or the biosphere forms an organic whole of functionally interconnected elements, with the sound working of each part being dependent on the sound working of the others. Thus, the integrity of the biosphere is essential to the self-realization of life on earth, and if we harm the rest of the natural world then we are harming ourselves.

Taylor (1981), argues for the adoption of an ultimate moral attitude of respect toward nature founded on the belief of biocentric equality. He feels that acknowledging the inherent worth of living entities is a presupposition of our taking the attitude of respect toward them and accordingly understanding ourselves as bearing certain moral obligations to protect or promote their good for their sake. As a consequence of adopting a moral attitude of respect toward nature, Taylor contends that one makes a moral commitment to abide by a set of rules of conduct and to fulfill certain standards of good character that are to govern our treatment of the natural world.

Leopold's (1949) belief in biocentric equality is expressed in his urging for a land ethic based on ecological consciousness. He states:

> All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. His instincts prompt him to compete for his place in that community, but his ethics prompt him also to co-operate.... The land ethic simply enlarges the boundaries of the community to include soils, water, plants, and animals, or collectively: the land. In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such (Leopold 1949, p203-204).

In summary, the preceding discussion on the types of values that can be associated with wetland environments has shown that intrinsic value has very different underlying assumptions compared to economic and social

values. Despite the differences, there need not be a conflict or imbalance between "people" values (economic and social) and "earth" values (intrinsic) when making resource allocation and management decisions. In the past, resource allocation decisions have been predominantly based on economic and social values with little regard for the importance of the earth's natural ecosystems. We have developed little value for the biosphere and as such, it is considered to be relatively unimportant compared to the needs and wants of people. This focus on "people" values in resource decisions has lead to environmental degradation (Rowe 1990). To address this issue, there must be a conscientious consideration and weighing of "people" and "earth" values.

> The Ecosphere is degenerating because of our people-first attitude, and a dual problem for environmental ethics is how to elevate the importance of the Ecosphere while putting a damper on the overweening pride and self-aggrandizement that plague our species. To value the Earth more and to value people *differently*- not less but as an essential collaborative part of it- seems necessary if over-exploitation of the globe is to be stopped. As long as the needs and wants of the people have first priority, we will continue to pummel the second priority- the planet (Rowe 1990, p141).

The biocentric perspective is not emphasized in this thesis. Rather, conservation of the wetland resource is discussed in the context of Pareto optimality and the economic and social benefits that accrue to the individual landowner and society. However, this thesis does explore the ability of nonregulatory mechanisms to shift landowner attitudes towards a stewardship ethic that recognizes the intrinsic value of ecosystems and communities of life.

2.2.5 Ensuring Sustainable Development

The success of efforts to sustain economic and social development ultimately depends on a healthy environment.

> In the 1980s it has become clear that human economic activity has seriously damaged the structural integrity of major ecosystems on every continent. To the extent that human populations are dependent on these ecosystems for essential renewable resources and ecological services, their future security is at risk (Rees 1988a, p1).

Our Common Future, the report of the United Nations "World Commission on Environment and Development" (WCED 1987), addresses the growing tensions between environment and the economy, and endorses the concept of "sustainable development" as the only viable route to ecological stability (Rees 1988b). As outlined by the WCED (1987), sustainable development is a broad concept for social and economic progress and change requiring that economic initiatives be integrated with environmental constraints in order to maintain or enhance the ecological base so that it may yield the greatest benefits to present generations while maintaining its potential to meet the needs and aspirations of the generations that follow. Sustainable development requires that the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change respect ecological boundaries to ensure the functional integrity of the environment is not destroyed through overexploitation and degradation. Rees (1988b) argues that sustainable development is set apart from traditional development planning because it explicitly recognizes our obligate dependency on a healthy biosphere.

From the literature, Gardner (1988) summarizes the main principles required for achieving sustainable development, one of which is the maintenance of ecological integrity. This principle encompasses the three

objectives of the World Conservation Strategy with regard to living resource conservation: maintaining essential ecological processes and life-support systems; preserving genetic diversity; and ensuring the sustainable utilization of species and ecosystems.

Pollard and McKechnie (1976) outline the three objectives of the World Conservation Strategy and the role of wetlands and wetland management in supporting those objectives. By contributing to the maintenance of ecological integrity, wetlands play a vital role in ensuring sustainable development.

(1) Maintaining essential ecological processes and life support systems - Essential ecological processes create and maintain the living components of the biosphere in general, and more specifically, sustain human endeavors to achieve economic and social development. They include global processes affecting climate, and carbon, water and nutrient cycling, as well as more regional or localized phenomena such as provided by wetland environments- for example, regulation of water flow, and maintenance of clean water. Because these ecological processes are vital to preserving life, they are known as life support systems.

Hydrological and ecological functions provided by wetlands are critical for maintaining certain essential ecological processes and life-support systems. Hydrologically, wetlands moderate flood peaks, help to control erosion, enhance water quality, and contribute to ground water recharge and discharge. The high primary production in wetlands provides for a complex, dynamic ecosystem with a great diversity of flora and fauna.

(2) Preserving genetic diversity - Preservation of genetic variation, both among and within species, has vital ends. The health and stability of

essential ecological processes and life support systems, the breeding programmes necessary to maintain and improve crops, livestock, timber, and aquatic life, as well as much scientific and medical advances, technical innovation, and the security of the many industries that rely on natural resources are dependent upon the preservation of genetic diversity.

Wetlands contribute to genetic diversity by supporting diverse communities of plants, waterfowl, mammals, and invertebrates. As well, they provide critical habitat for many rare and endangered species.

(3) Sustainable utilization of species and ecosystems - that is, managing the use of living resources so that they last indefinitely. If a species is overharvested or an ecosystem overly degraded, a point will be reached when the species is so depleted or the ecosystem so degraded that its value to humans will be severely reduced or lost.

Conservation and prudent management of wetlands will ensure present and future generations will benefit from the many hydrological, ecological and social functions they provide.

2.3 Agricultural Impacts on Prairie Potholes

The prairie pothole region has been severely impacted by agricultural expansion and intensification. Over the last century, the loss and degradation of wetlands in all parts of the pothole region has been progressive and severe, and is accelerating. Larger, readily drainable wetlands were originally reclaimed for agriculture because they were viewed as potentially productive farmland. More recently, agricultural incentives provided by government, coupled with economic pressures brought on by high interest rates and low commodity prices, have forced farmers to press every

available acre into production, including marginal farmlands, thereby eliminating and degrading wetland basins and margins (Lynch-Stewart 1983). This wide-spread assault on wetlands has ecological implications and has been cited as a major factor in the diminishing annual production of waterfowl.

2.3.1 Transformation of the Rural Landscape

Historically, agricultural reclamation has been the major force behind wetland decline in the pothole region. The demand for increased agricultural expansion was formerly met by breaking large tracts of new land. As the supply of suitable new lands decreased, producers endeavored to increase production through intensifying operations on existing holdings including the drainage and cultivation of wetlands. Prolonged periods of drought- a common and integral part of the prairie environment- encouraged the conversion of wetlands to agricultural uses by exposing potentially arable dry basins. Draining, filling and cultivating wetlands has resulted in widespread and significant cumulative losses of the wetland resource base (Turner et al. 1987).

It is estimated that from settlement to 1976, 1.2 million hectares or 40 percent of original prairie wetlands were lost to agricultural uses. Numerous site-specific studies in Alberta, Saskatchewan and Manitoba indicate that wetland losses range from 9 to 71 percent of the original wetland area. In Alberta's parkland region, only 39 percent of the original pre-settled wetlands remained by 1970. In the Minnedosa region of southwestern Manitoba, total wetland area declined 57 percent during the period 1929-1974 with a further 33 percent loss from 1974 through to 1982.

This suggests losses in the Minnedosa region are progressively increasing with time (Lynch-Stewart 1983 and National Wetlands Working Group 1988).

As reported by Turner et al. (1987), studies documenting annual drainage rates in Prairie Canada are uncommon. A five year study showed approximately 1 percent average annual drainage rates at selected sites in the pothole region. Annual drainage rates of 1 to 5 percent have been observed in the north-central United States. The authors of the study caution that although observed drainage rates are low, the continuing loss is a serious problem when viewed in the context that only 60 percent of original prairie wetlands remain, and that destruction of many wetland functions is irreversible.

2.3.2 Deteriorating Wetland Quality

In addition to the loss of wetlands through drainage, the quality of remaining wetlands is deteriorating due to secondary and transitory impacts from farming practices. Schmitt (1985) and the Canadian Wildlife Service (1986) report that the impact of drainage and/or intensive agriculture is seldom confined to the immediate area. As a result of secondary impacts from extensive cultivation and drainage, remaining wetlands are being degraded through siltation, increased turbidity, flooding, and chemical contamination. A study to monitor transitory agricultural impacts on selected prairie wetland areas was put in place in 1981 by Turner et al. (1987). Transitory impacts include haying, burning, clearing, grazing and cultivating of wetland margins and dry or partially dry basins. Over a five year period results showed that an average of 54.5 percent of the basins and 79.2 percent of the margins were degraded through transitory impacts and that their occurrence increased over time. The authors suggest

that the wetland resource would restore naturally from these impacts if not disturbed on an annual basis; however, if transitory impacts are inflicted annually they are tantamount to being permanent.

Not all agricultural production conflicts with the conservation of wetland environments. There are many agricultural management practices that are compatible with maintaining wetland basins, margins and surrounding uplands. If land within the vacinity of wetlands is in a pasture situation, livestock grazing systems such as supplemental fall-seeding which provides late fall and early spring grazing and rotational grazing involving cross fencing of pastures into several paddocks better maintains margins and uplands versus a continuous grazing system. If in hay cover, delayed haying is recommended until July 15 to allow the completion of waterfowl nesting cycles. Perennial cover in wetland margins and uplands can also be more intensively managed for both agricultural and wildlife habitat purposes. A grass-legume mixture is planted providing a dense nesting cover for waterfowl and periodic grazing or haying for rejuvenation purposes. Land managed for dense nesting cover may be fenced to discourage predators (Alberta Habitat Joint Venture Technical Committee 1989 and Prairie Habitat Joint Venture Advisory Board 1990).

2.3.3 Waterfowl Decline

Widespread loss and degradation of prairie wetlands is a major factor in the diminishing annual production of waterfowl. The decline of migratory waterfowl in the prairies has been extensively documented due to their prominence and economic importance as game birds. Other ramifications of wetland drainage are not readily measured or have been overshadowed in the prairie wetland literature due to an emphasis on loss

of waterfowl habitat (Lynch-Stewart 1983 and National Wetlands Working Group 1988).

Prairie drought is the cyclical generator of waterfowl productivity- low water levels restrict nesting effort and reduce brood survival with subsequent wet years producing large numbers of ducklings. The drought of the early 1960s saw drastic reductions in duck numbers. More than two decades of improved, often wet conditions should have stimulated a resurgence in duck populations; however, several key species such as the Northern Pintail and the Mallard have shown disturbing declines (Cowan 1988).

The growth of the agricultural industry and intensified land use has paralleled declining duck populations. Agricultural development of the prairies has interrupted the natural relationships that have evolved between migratory waterfowl and their environment. Loss and degradation of wetlands and wetland margins have concentrated waterfowl and their predators in remaining patches of suitable habitat or forced nesting in sub-optimal areas where predation is high. As a result, over much of the prairie pothole region, nesting success is inadequate to maintain or build certain waterfowl populations even in years of favorable water conditions (Canadian Wildlife Service 1986 and Brace and Pepper 1984). Prior to widespread degradation of wetland margins, 40 percent of Mallards successfully reared broods. Currently, nest success rates across the pothole region are less than 15 percent, the minimum level necessary for self-sustaining Mallard populations. The continuing loss and degradation of wetland habitat coupled with the drought of the mid to late 1980s has severely impacted duck populations. In 1988, the Mallard breeding population on the prairies was only 1.7 million breeding birds- a decrease

of 50 percent from the 1955-87 long-term breeding averages. Northern Pintail numbers in the same year were 365,000, down 85 percent (Hochbaum et al. 1988).

There have been arguments that hunter harvest is the cause of the duck decline. However, Ducks Unlimited (1989) maintain that evidence from years of banding does not support this contention. Public and private sector biologists agree that the declining prairie-nesting waterfowl species is attributable to inadequate production of fledged ducklings. Maintenance of quality wetland basins and margins are required to boost recruitments and rebuild duck populations on a broad scale.

2.3.4 Disruption of the Prairie's Ecological Balance

The Manitoba Departments of Agriculture and Natural Resources (1985), Cowan (1988) and National Wetlands Working Group (1988) have noted that the trend towards wide-spread eradication of wetlands is threatening the health of the prairie ecosystem. Salt accumulation in the soil may increase as farmers remove wetlands and/or upland margins. With extensive wetland drainage, runoff water with its load of silt, fertilizers, and agricultural chemicals eventually accumulates in streams. The loss of the wetlands water storage capacity increases the potential for flooding downstream. Water filtration plants may be needed along streams to replace the natural filtration process of drained wetlands. When the climax vegetation native to pothole environments is disturbed, it is frequently replaced by typical early-successional weed species which can become well established during periods when typical weed control measures cannot be carried out.

2.4 Causes of Wetland Drainage

Socio-economic constraints at the landowner and societal level as well as constraints within our current institutional arrangements play a major role in the continuing loss of wetlands in the prairie pothole region.

2.4.1 Socio-Economic Considerations

1) Individual landowner - The economic and social values of prairie wetlands primarily accrue to the general public rather than to individual landowners. Most prairie potholes are found on private land, the majority of which is operated by farmers and ranchers. Individual landowners attempting to maximize returns to ownership of agricultural land cannot capture payment for most of the benefits provided by natural wetlands. They have no way of selling flood control, water quality enhancement, landscape aesthetics, or most of the non-market social values of wetlands. As a result, the landowner decision regarding wetland drainage versus retention usually gives consideration to only private benefits and costs and excludes the benefits and costs to society (Jaworski 1981 and Leitch 1988).

This wealth-maximizing decision framework, as argued by Phillips and Veeman (1987), tends to favor the conversion of wetlands to uses which provide private market returns with the result being that the quantity of wetlands drained may not be in the best interests of society. Because of the predominant societal benefits of wetland environments, the self-interest decision of the landowner to drain wetlands has implications beyond the boundary of the farm. The costs of contending with or correcting the loss of economic and social values associated with wetlands

are borne by society rather than the individual landowners. Such external costs or externalities, unless taken into account in the drainage decision of the landowner, will likely lead to results inconsistent with the interests of society. An excessive amount of drainage may occur resulting in a less than optimal amount of wetland preservation from society's view. As well, landowners may manage their land, including wetland drainage, such that the interests of future landowners (future generations) are not taken into account. In such circumstances, societal goals of intergenerational equity are not met.

When examining benefit-cost tradeoffs of wetland retention from a broad perspective, the optimal amount of wetland retention which renders the greatest net benefit to society has a negative impact on landowners in general. Phillips and Adamowicz (1986) point out that the concept of Pareto optimality is not concerned with who gains and who loses from changes in resource use patterns. That is, it does not address the equitable distribution of costs and benefits among individuals and groups of individuals in society. For example, the expansion of the agricultural land base into forested areas may result in economic and social losses to outdoor recreationists, forestry interests and others. However, the gains elsewhere in society from the alternative use may more than offset the losses to these groups in society and therefore justify the change on efficiency grounds.

Although private landowner decisions to convert prairie potholes to agriculture uses may not be in the best interests of society, in general, it has been a rational economic decision by farmers. Leitch (1983), Desjardins et al. (1984), and Baltezore et al. (1987) have demonstrated that when landowners are not made liable for off-farm and mitigation costs,

drainage of wetlands is financially feasible. By draining wetlands, landowners can capture some of the benefits of the wetland resource through increased crop production and decreased avoidance costs of having to farm around obstacles. Drainage is often the least costly avenue for expanding total arable acreage when the alternative is purchase of new land at high land costs. The efficiency of field operations is decreased by the presence of wetlands and is reflected in avoidance costs such as overlapping operations and extra time spent in the field. Aside from the monetary benefits of wetland drainage there are also several nonmonetary benefits such as the satisfaction of clean fields and uniform moisture conditions throughout the field (Leitch 1988 and Danielson and Leitch 1986).

2) Society - Early public policy towards wetland environments favored drainage by landowners. Wetlands have traditionally been considered wastelands with little economic or social value. As a result, little interest and study of wetland environments led to a fundamental lack of understanding about wetland functions and the importance and extent of these functions. This lack of understanding extended to virtually all resource sectors, legislators, economists, the scientific community, and the general public and resulted in laws and programs repeatedly enacted to encourage the conversion of wetlands to other uses (Usher and Scarth 1988). The Federation of Ontario Naturalists and Environment Canada (1987) contend that a lack of understanding extends to the present due to the diverse nature of wetland functions not being readily understood, the inability to measure many wetland values within our present system of resource allocation, and a shortage of education directed towards the general public, decision makers and landowners regarding the benefits of wetlands

and the consequences of continuing wetland loss. Wallace and Lane (1988) suggest that these shortcomings, coupled with the immediate economic benefits readily calculated and realized from agricultural production, have resulted in public indifference to the loss and degradation of wetlands. There has not been a well-directed effort by society to become involved in individual resource management decisions pertaining to wetland retention. Therefore, drainage decisions are commonly left almost exclusively up to the individual landowner with little government intervention through policies and programs.

2.4.2 Institutional Considerations

Jurisdictional responsibility over wetlands in Canada is spread among federal, provincial, and municipal governments, and among different government departments and agencies. None of the many government departments and agencies at any one level is completely responsible for wetlands management and conservation. Although limited efforts have been made, inadequate coordination and communication among those holding jurisdictional responsibility has been cause for a lack of unified and long-term wetland management planning and a lack of accepted principles regarding wetland uses and values. As a result, initiatives to enhance or protect wetland environments have tended to be sporadic, reactive and uncoordinated (Wallace and Lane 1988). Non-government organizations, in recommending wetlands conservation policy in Canada (Federation of Ontario Naturalists and Environment Canada 1987), suggested that the need is not for one bureau to take responsibility over wetlands. Rather, the need is to stress better communications and consistent, enforced policy that is adopted by all government agencies. Scace and Associates Ltd. (1989) point

out that it was only in the late 1980s that the federal and provincial governments began developing consistent and integrated wetland policy. For example, the Alberta Water Resources Commission, in conjunction with four other provincial departments with direct involvement in wetland management, initiated studies in 1988 towards the development of an Alberta wetlands policy.

Aside from coordination and communication problems within current legislative regimes, Wallace and Lane (1988) contend that differing legislative mandates and interests among the provincial and federal agencies pose problems of conflicting legislation, policies and programs. Federal and provincial agricultural departments have numerous policies and incentive programs for the development and expansion of agricultural lands which may seriously jeopardize wetlands. In contrast, wildlife interests may be attempting to conserve, protect or expand just such wetland areas through their own policies, programs and legislation. Major government policies or programs promoting agriculture expansion and intensification through income and property tax incentives, low interest loans, drainage and transportation subsidies, and so on are often strong financial inducements to landowners to cultivate wetland basins and margins. Unfortunately, such policies or programs usually do not consider the "secondary" impacts that affect wetlands or the potential conflict with initiatives to promote wetland retention on private lands. Assessing the true magnitude of legislative conflicts can be difficult because they can emanate from diffuse and subtle origins. For example, a low interest loan subsidy for land purchase and development may directly accelerate the conversion of wetland basins and/or margins to agricultural land considered marginal for crop production.

As an example of current legislative conflicts which hamper wetland conservation and management efforts, Appendix I provides an overview of both federal and provincial legislation with potential impacts on wetlands in Alberta. The majority of the legislation has either a negative or positive impact on wetland environments; some pieces of legislation have both positive and negative impacts.

2.5 Summary

In this chapter, arguments have been presented that justify the conservation of wetlands. Wetlands were identified as providing hydrological, ecological and social functions, many of which are irreversible once the wetland is destroyed. These functions have associated economic, social and intrinsic value, and play a role in achieving sustainable development. This rationale for wetland conservation gives support to the need for this study of wetland retention in the prairie pothole region of Canada.

The agriculture-wetland interface on private landholdings in the prairie pothole region has been delineated as the context within which the issue of wetland retention will be studied. The causes and effects of wetland drainage and degradation have been discussed in this context. Socio-economic constraints at the landowner and societal level and constraints within current institutional arrangements have been recognized as the cause of wetland drainage and degradation. Private landowners cannot capture the benefits provided by wetlands and there is public indifference to wetlands losses due to a poor understanding of their functions, the inability to account for many wetland values in our current system of resource allocation, and easily realized monetary benefits from

agricultural production. As well, there are coordination and communication problems within our current legislative regimes responsible for wetland management, and conflicting legislation, policies and programs among federal and provincial agencies have negative consequences for wetland conservation and management. The resultant impacts on wetlands of these socio-economic and institutional problems are: 1) destruction of wetlands across the prairie pothole region, 2) deteriorating wetland quality, 3) waterfowl decline, and 4) disruption of the prairie's ecological balance.

In the next chapter, regulatory and nonregulatory mechanisms for encouraging the stewardship of wetlands on private lands will be examined. This will establish the groundwork for the following section on promoting private stewardship through nonregulatory tools.

III. POLICY ALTERNATIVES FOR WETLAND RETENTION

3.1 Introduction

Central to the policy goal of encouraging private landowner stewardship of wetlands on the prairies is the expectation that society will be better off with implementation of wetland conservation measures than without such implementation. There are a number of policy instruments that may be used to encourage wetland conservation. This chapter explores the wetlands issue from two different general policy instrument perspectives- regulatory and nonregulatory. A broad overview of the advantages and disadvantages of regulatory and nonregulatory mechanisms for promoting stewardship of wetland environments on private landholdings is presented. In order to provide this overview, it is necessary to first consider the concepts of landownership and property rights.

3.2 Landownership and Property Rights

Landownership refers to the legal interest in a parcel of land, that is, the rights in the property which the law will recognize and protect (Hamilton and Baxter 1977). Thus, ownership consists of legally defined user rights to an asset such as the right to use your property in certain ways, the right to prevent others from using the property, except with your permission and on your terms, and the right to sell your ownership rights to someone else. The fact that certain uses are restricted by the state does not diminish the content of ownership, that is, the many rights that define ownership remain intact (Dales 1977 and Bromley 1982).

A discussion of policy instruments with regard to encouraging private landowners to retain wetlands requires a clear definition of wetland

ownership and associated user rights. In Alberta, for example, the ownership of non-permanent wetlands is an issue. Legislation provides that the Crown is the owner of the beds and shores of all "permanent" wetlands. A judicial interpretation in 1983 has been accepted to mean that only those wetlands that have never been dry in recorded history are owned by the Crown. Most prairie wetlands are not permanent by this definition and as a result, landholders are claiming ownership of the beds and shores of so-called non-permanent wetlands. Given a more liberal interpretation of permanence, widespread claims of Crown ownership would still be unlikely. The Crown would become the owner of many small, widely scattered wetlands and thus assume responsibility for weed control, access and liability, inevitably creating management and funding problems. As well, it would be perceived that the government was taking land away from the individual, likely creating animosity among landowners (Alberta Water Resources Commission 1989). For purposes of this thesis, it is assumed that ownership of the beds and shores of wetlands, regardless of permanency, lies with the individual landowner.

3.3 Regulatory Mechanisms

This section begins by examining the concepts of police power and compliance. A discussion on how regulatory tools can be used to promote private stewardship of wetlands is then presented and is followed by an overview of the advantages and disadvantages of using this approach to encourage stewardship.

3.3.1 Police Power and Compliance

Police power is the power of government to regulate the behavior of individuals in society in order to protect the public welfare, health, safety and morals (Randall 1981). In developing a definition of regulation that sets it apart from other policy instruments of government, Priest et al. (1980) argue that regulations operate through command and control. They require that certain behavior (actions or conduct) takes place, such as meeting established performance standards, or they prohibit certain behavior. A policy tool delivered through pure command relies on penalties to enforce the government's will. That is, compliance is monitored and noncompliance is punished. Inherent in the concept of commands backed by penalties is the narrowing of choice. While other policy instruments affect alternatives and may reduce the number of alternatives available to an individual, the narrowing of certain choices is a primary purpose of regulation. A command in the form of a prohibition will eliminate the prohibited activity from the set of choices available to an individual. Consequently, Priest et al. define regulation as:

> ...the imposition of rules by government, backed by the use of penalties, that are intended specifically to modify the economic behavior of individuals and firms in the private sector (Priest et al. 1980, p10).

The performance of a regulatory system can be measured by the degree of enforcement. Thus, compliance relations can be a central element of a regulatory system (Priest et al. 1980). Rosenbaum (1978) argues that voluntary compliance based upon public acceptance and support is a far stronger foundation upon which to build a regulatory system than forced compliance based upon the effect of stringent enforcement activities. Etzioni (1961, pxv) defines compliance as "... a relationship consisting

of the power employed by superiors to control subordinates and the orientation of the subordinates to this power". Etzioni argues that those in power positions manipulate means which they command in such a manner that subordinates, or those with less power, find following the command rewarding, while not following it incurs deprivations. The means employed to make subordinates comply can be physical, material, or symbolic and define three major sources of control or power: 1) coercive power based on the application or the threat of application of physical sanctions such as restriction of movement, 2) remunerative power based on control over material resources and rewards, and 3) normative power such as the allocation and manipulation of symbolic rewards, esteem and prestige symbols.

The orientation of the subordinate to power can be characterized as positive (commitment) or negative (alienation). Commitment or alienation is determined by the degree to which the power applied is considered legitimate by the subordinate, and by how the power corresponds to the line of action the subordinate desires.

> Alienation is produced not only by illegitimate exercise of power, but also by power which frustrates needs, wishes, desires. Commitment is generated not merely by directives which are considered legitimate but also by those which are in line with internalized needs of the subordinate (Etzioni 1961, p15-16).

Etzioni suggests that normative power is most likely to be considered legitimate followed by remunerative power; coercive power is least likely to be recognized as legitimate.

3.3.2 Regulation and Wetland Retention

Police power regulation provides a mechanism whereby society, exercising influence through all levels of government, may seek to control

the uses landowners make of their property through coercive power (Randall 1981). Because of the benefits to society of wetland retention and externalities associated with wetland drainage, society may wish to assert a "public interest" by placing prohibitions or restrictions on the landholder's right to drain. By interfering with the rights of landowners to use and manage their property, society would then govern the decision to drain or retain wetlands based on societal demand. This would ensure that those wetlands deemed valuable to society would be preserved (Alberta Water Resources Commission 1989). Prohibition and the imposition of performance standards is typical of environmental regulation which attempts to restrict actions which could potentially harm resources of benefit to society. Environmental regulation includes areas such as the control of air and water pollution, land use regulation, and the environmental management aspects of resource development (Economic Council of Canada 1979).

Regulating wetlands can be accomplished through a variety of approaches. With regard to regulating sensitive areas such as wetland environments, Kusler (1980) notes that two regulatory approaches could be commonly used- statutes authorizing direct provincial regulatory control of land uses, and zoning which is a local regulatory technique. Zoning includes restricting the types of uses permitted in particular areas such as the prohibition of fills in wetlands. It also includes performance standard provisions which define the maximum permissible impact of specific uses on resources such as removal of vegetation, alteration of natural drainage, and so forth. Performance standards are commonly applied through special permit requirements. To obtain a permit, the applicant must prove that use impacts will not exceed allowable levels.

3.3.3 Advantages and Disadvantages of Regulatory Mechanisms

The advantages and disadvantages associated with using regulatory mechanisms to encourage private stewardship of wetlands are, in part, dependent upon how receptive landowners and the general public are to the use of coercive power to protect wetlands. Recent public workshops across Canada and in Alberta regarding environmental protection indicate that Canadians are not receptive to regulatory mechanisms which interfere with the use and management of an individual's property. Public consultations for development of the Canadian Government's environmental action plan- The Green Plan- resulted in a set of recommendations for wetland preservation that emphasized the use of private landowner education and incentives rather than the use of regulatory mechanisms (Government of Canada 1990). These same recommendations were common during the Alberta Water Resources Commission's public meetings held throughout Alberta in late 1990 to discuss a draft policy for the management of wetlands in the settled area of Alberta (Fullen 1991). This poor receptiveness of Canadians towards interference with individual property rights is reflected in the recently implemented National Soil Conservation Program which is a cost-shared federal-provincial program to promote soil conservation. Rather than using regulations to encourage stewardship of the soil resource, this program emphasizes the use of landowner awareness and financial incentives (Federal-Provincial Agriculture Committee on Environmental Sustainability 1990).

Given the negative attitude towards infringement of private property rights, the use of regulatory mechanisms to promote private stewardship of wetlands is perceived by landholders and the general public as having few advantages, most of which accrue to society, and many disadvantages, most

of which accrue to the individual property owner. The following discussion on the advantages and disadvantages of regulatory mechanisms in encouraging private stewardship reflects the poor societal receptiveness towards this policy instrument.

With regard to the advantages of regulatory mechanisms, Kusler (1980) specifically notes that regulation has successfully protected wetlands through use restrictions and performance standards. Kusler also notes that regulation can promote and meet broader local, provincial and national economic, social and environmental goals by requiring that land uses be consistent with broader land and water management efforts. The Economic Council of Canada (1979) argues in favor of regulation as a potentially successful mechanism for increasing efficiency in the use of scarce resources and their allocation in accordance with market demands. Thus, regulation may be successful in attempting to achieve the Pareto optimal amount of wetland retention which renders the greatest net benefit to society.

With regard to the disadvantages associated with regulation of land use, the Alberta Water Resources Commission (1989) suggest there is a political cost to interfering with an individual's property rights. Direct public interference in landowner decisions regarding use and management of their land base may not be considered a legitimate exercise of power and thus compliance may have to be strongly enforced. Baumol and Oates (1979) contend that alienation towards a regulation and the resultant forced compliance through stringent enforcement may lead to a regulatory process that is not certain and automatic and thus lacks reliability in achieving objectives. For example, violators of a regulation must first be caught in the act and then must be prosecuted, found guilty, and given a substantial

penalty. If any of these steps fail, the violators get off virtually free despite their disregard for the law. In addition, landowner alienation may result in high monitoring and enforcement costs thereby reducing the cost efficiency of regulatory mechanisms. Regardless of potential societal health and welfare benefits from environmental policy, if the costs of the policy mechanism are exceedingly high then societal and political acceptance is much more difficult to achieve. Randall (1981) points out that, if supported, police power can provide government with a relatively inexpensive method of controlling the uses made of privately owned property.

Further, interference with property rights to protect wetlands may have equity consequences which increase the political cost of regulatory tools. Randall (1981) argues that police power regulation of land use may significantly influence a property owner's prospects of income and wealth. In Canada, the government is not required to pay compensation to a landowner whose use of a property and associated economic opportunities is reduced as a result of regulation (Hamilton and Baxter 1977). Therefore, a regulatory mechanism, by its nature, may redistribute wealth- increasing economic opportunities for some individuals while decreasing them for others. The Alberta Water Resources Commission (1989) supports this argument by pointing out that in the case of wetland retention, prohibition of wetland drainage provides benefits to society at the expense of the landholder. The owners' rights to use and manage their property as they wish, including conversion of wetlands into agricultural production for potential monetary gain, is removed without compensation. Thus, regulation that conserves wetlands makes society better off but leaves landowners worse off because they have lost a right previously enjoyed and have not

been compensated for that loss. The Economic Council of Canada (1979) points out that policy action that improves economic efficiency in resource allocation without regard to equity considerations could have negative impacts on specific groups in society, for Pareto optimality is not concerned with the distribution of income or wealth. A counter argument to equity concerns, as suggested by the Alberta Water Resources Commission (1989), is that landowners are members of society as well and thus receive the same benefits from prohibition of wetland drainage as do other members of society. This argument may have more acceptance among landowners if they felt regulation of private land use and management was a legitimate exercise of power and thus were committed to its use.

Another disadvantage of regulatory mechanisms is recognized by Deknatel (1979). This author points out the centralization and associated inherent inflexibility of regulations. Regulations covering large areas cannot take into consideration the attitudes and actual behavior of a landowner. As a result, public objectives are carried out on private land in a prescriptive manner with little input from affected owners, rather than in a manner that is flexible and cooperative.

3.4 Nonregulatory Mechanisms

This section begins by discussing how nonregulatory mechanisms can be used to promote private stewardship of wetlands and concludes with an overview of the advantages and disadvantages of using this approach to encourage stewardship.

3.4.1 Wetland Retention Through Nonregulation

Nonregulatory mechanisms aim to induce individuals to alter their behavior rather than command behavioral changes through the exercise of police power (Baumol and Oates 1979). The Alberta Water Resources Commission (1989) and Goldsmith and Clark II (1990) suggest that two general nonregulatory approaches, economic incentives through market processes and moral suasion, can be used separately or in combination to promote private stewardship of wetland environments. They contend that the essential characteristic of a nonregulatory approach is that property management decisions ultimately lie with the landowner. Society does not interfere with their rights to use and manage their property including drainage of wetlands.

Nonregulatory approaches which involve the acquisition of lands from individuals, either by the public sector or a private, semi-public organization acting in the public interest such as a land trust, are beyond the scope of this thesis.

Following is a general overview of the market and moral suasion approaches. A more detailed discussion of the common market and moral suasion mechanisms used to promote private stewardship of wetlands is presented in the next chapter.

(1) Market approach - Recognizing that landowners have an economic stake in wetlands, this approach strives to establish economic incentives that encourage and assist landowners in protecting wetlands valuable to society while contributing to a reasonable return on their investment (The Conservation Foundation 1988). According to Goldsmith and Clark II (1990), property tax credits and exemptions, and direct payment via management or lease agreements are common market mechanisms which offer private property

owners economic incentives to retain wetlands. In both situations, landowners who forego the benefits of drainage are compensated by society. This manipulation of monetary resources and rewards to promote private stewardship is a form of remunerative power as defined by Etzioni.

The Alberta Water Resources Commission (1989) also notes a laissez-faire method could potentially be used as a means of providing economic incentives to landholders. Under this system, property owners would bargain with other members of society for certain wetland benefits such as the use of wildlife for consumptive and nonconsumptive purposes. In this situation, economic transfer occurs between individuals instead of between landowners and society as a whole. A similar approach was recommended by Ryder and Boag (1981) for the preservation of wildlife. They called for the establishment of a fee schedule payable to the landowner for specified uses of habitat. Currently, Saskatchewan and Alberta specifically prohibit property owners from charging trespass fees for access to wildlife; therefore, the laissez-faire method is not dealt with further in this thesis.

With regard to the level of incentive offered to landholders, Danielson and Leitch (1986) argue that the lower bound would have to be at least equal to the net private benefits an owner expects to obtain through drainage while the upper bound is defined by the social cost of draining wetlands. This argument is based on the assumption that the net private benefits of wetland drainage is less than the actual value that society places on the wetland.

(2) Moral Suasion - This approach attempts to persuade landowners to voluntarily forego the benefits of wetland drainage without the offer of an

economic incentive. It is based on the use of normative power, as defined by Etzioni, and includes the allocation of symbolic rewards, and esteem and prestige symbols. Inherent in this voluntaristic approach is a recognition by landholders that they have a social responsibility for conserving wetlands (Baumol and Oates 1979). The Alberta Water Resources Commission (1989) suggests that acceptance of social responsibility by landowners changes their demand for drainage. In private benefit/cost analysis decisions, they are convinced to place a higher value on the non-cash benefits of wetlands such as stability of water supply, intergenerational equity and so on. According to Goldsmith and Clark II (1990), education campaigns directed towards wetland owners and landowner recognition are common moral suasion mechanisms to promote private wetland conservation.

3.4.2 Advantages and Disadvantages of Nonregulatory Mechanisms

The limited extent to which Canadians are receptive towards interference with an individual's property rights as well as their support for the use of economic incentives and moral suasion to achieve conservation goals on private lands, determines, in part, the advantages and disadvantages associated with nonregulatory mechanisms. Given the positive attitude towards nonregulation, the use of nonregulatory tools to promote private stewardship is perceived by landowners and the general public as having many advantages which accrue to both landholders and society in general, and few disadvantages, most of which accrue to society. The following discussion on the advantages and disadvantages of nonregulatory mechanisms in encouraging private stewardship reflects the high degree of societal receptiveness towards this policy instrument.

With regard to the advantages of nonregulatory mechanisms, Baumol and Oates (1979) contend that nonregulatory tools can be politically more acceptable because of their minimal societal interference with landowner property rights thus allowing owners ultimate control over wetland drainage decisions. This political acceptability is enhanced by the positive equity consequences which are associated with owners' controlling land use decisions. The Alberta Water Resources Commission (1989) notes that retaining wetlands through either moral suasion or the market approach leave neither the property owner nor society worse off. Landowners' voluntarily retaining wetlands indicates that they feel they are at least as well off conserving wetlands versus draining them for agricultural production. This is a result of the owners' placing a high value on the non-cash benefits of wetlands in their private benefit/cost decisions regarding land use. With the market approach, Davis and Kamien (1977) point out that acceptance of compensation indicates that the landowner is at least as well off as before, while an offer of an economic incentive by society indicates that it is at least as well off as before.

Deknatel (1979) and Phillips and Veeman (1987) have recognized that another advantage to nonregulatory mechanisms is their decentralized or "grass roots" approach. They argue that with a decentralized approach, public objectives can be carried out on private land in a cooperative and flexible manner. The focus can be on cooperating directly with the landowner as decision maker or implementor, taking into account the local circumstances, the landowner's economic status, site-related knowledge, needs and wishes, and so on. Such cooperation permits an integration of landowner and societal concerns. Morgan (1987) maintains that an approach that is one-on-one and can be tailored to specific areas and specific needs

of the landholder allows the wetlands issue to be dealt with comprehensively or holistically.

Another advantage of nonregulatory tools, as suggested by The Conservation Foundation (1988), is that, if properly implemented, they can support and supplement other government wetlands protection efforts. Economic incentives can support regulatory tools by reducing the financial costs wetland preservation regulations impose on landowners. Moral suasion can supplement regulations by encouraging voluntary private protection of wetlands, thereby lessening the need for government regulation.

With regard to the disadvantages associated with nonregulatory mechanisms, Baumol and Oates (1979) point out that the offering of a strong economic incentive through tax breaks or subsidies does not produce results at low cost to society. (In contrast, an advantage of moral suasion is its potential cost efficiency). Feist (1979) suggests that economic incentives offer no long-term investment for public money. There is no guarantee a landowner will continue to conserve wetlands once incentives are removed or reduced. A criticism of the Alberta Water Resources Commission (1989) regarding economic incentives is that there is no way of determining the landowner's true intent to drain other than relying on their honesty. Thus, by using tax breaks or subsidies, society would undoubtedly be paying some owners to retain wetlands that they had no intention of draining.

3.5 Summary

This chapter explored the issue of promoting stewardship of wetlands on private land holdings from a regulatory and nonregulatory perspective. Both regulatory and nonregulatory policy mechanisms are viable approaches for encouraging private stewardship. However, evidence favors the use of

nonregulatory approaches, including economic incentives and moral suasion, as a means of convincing landowners to retain wetlands rather than commanding conservation through police power regulation.

It was established that landowners and the general public in Canada are more supportive of nonregulatory mechanisms than of regulation as a means to achieving wetland conservation objectives on private landholdings. The societal receptiveness towards these two policy instruments bias the positive and negative aspects associated with each. The use of remunerative (economic incentives) and normative (moral suasion) power to promote private stewardship of wetlands was identified as having many positive aspects, especially for the landowner. Owners retain ultimate control over land use management thus allowing them to make decisions, including wetland retention, that are in their best interest from a benefit-cost view point. As well, the cooperative, flexible manner in which nonregulatory tools can be administered ensures that specific landholder interests and needs are taken into consideration. This approach to encouraging stewardship, which treats landowners in a very positive way while emphasizing their responsibility in conservation, will likely be considered a legitimate exercise of power and, therefore, should receive owner support and commitment.

In contrast, the use of coercive power (regulation) to encourage private stewardship was identified as negatively impacting landowners. Commanding wetland retention through regulatory mechanisms requires direct public interference in private management decisions. Owners are forced to support a land use which does not maximize their returns from investment in agricultural land, and they are not compensated for the loss in income. As well, regulatory mechanisms are centralized and inflexible and cannot deal

with the property owner on a one-to-one basis. This approach to promoting stewardship, which is not sensitive to the needs and interests of the individual landowner, will likely be considered an illegitimate exercise of power and, therefore, owner support and commitment will be weak, requiring enforced compliance.

From a societal perspective, it was recognized that the use of nonregulatory mechanisms to promote private stewardship has economic disadvantages. Providing strong economic incentives to landholders is costly; it is not a sound long-term investment of public money because there are no guarantees that wetlands will be retained once incentives are removed; and incentives will be offered to some owners who had no intention of draining wetlands. In contrast, regulatory mechanisms can be quite cost- effective for controlling land uses except in situations where high levels of monitoring and enforcement are necessary due to poor compliance.

Despite the nonregulatory approach having negative societal impacts from a cost point of view, this approach has the potential for greater positive societal impacts through building certain ethics in landowners. The cooperative, educational, one-on-one approach of nonregulatory tools "...get at the question of the attitudes and actual behavior of a landowner or operator in a way that regulatory and centralized programs seldom do" (Deknatel 1979, p263). Thus, nonregulation has a greater potential than regulation for changing landowner attitudes with regard to care and conservation of natural areas for present generations and responsibility to future generations. With police power demands to practice stewardship, property owners may just be complying with regulation and have no feelings of social responsibility and thus stewardship towards wetland environments.

Although nonregulatory mechanisms are recognized as the preferred approach to promoting private stewardship, it must also be recognized that some solutions, such as those of a short-term, stop-gap nature, must be prescribed through regulations. As well, regulatory and nonregulatory tools should not be considered mutually exclusive. There may be situations in which the use of nonregulatory mechanisms can support and supplement regulations. They can compensate landholders for lost income associated with prescribed wetland retention and encourage them to voluntarily conserve natural areas. As well, the use of economic incentives and moral suasion techniques in association with regulations can help to legitimize the use of coercive power.

> Education, encouragement and incentives can bring landowners to the point where they understand and support the benefits of the regulations that are being imposed on them (Van Patter et al. 1988, p168).

In a longer-term, the more effective nonregulatory tools are in convincing landowners to practice stewardship, the less need there will be for enforcement of regulations and for the use of coercive power.

In the next chapters, attention will be given to evaluating common nonregulatory mechanisms for promoting private stewardship of wetlands. This nonregulatory focus has been justified in this chapter which established that, from a landowner and societal perspective, nonregulatory tools are preferable to mandatory controls in encouraging landowners to retain wetlands. This research focus on nonregulatory mechanisms is also justified by the fact that the use of economic incentives and moral suasion techniques is a relatively new approach to dealing with the issue of private stewardship and thus there is a need for research on this topic.

IV. PROMOTING PRIVATE LANDOWNER STEWARDSHIP THROUGH NONREGULATORY MECHANISMS

4.1 Introduction

Landowners are ultimately the front line of wetland conservation. A nonregulatory approach to conserving wetlands must be directed towards convincing them to practice stewardship. To gather support from a broad spectrum of landholders, nonregulatory mechanisms must create a capacity for meeting their interests and concerns. Landowner appeal is a measure for how successful these mechanisms will be in encouraging private stewardship. If a mechanism has poor acceptability then it is highly unlikely that it will be successful in promoting stewardship of wetlands.

The purpose of this chapter is to identify the probable landowner acceptability of common nonregulatory mechanisms used to promote private stewardship of wetlands. To accomplish this, a comparative analysis is presented which assesses the apparent advantages and disadvantages of the mechanisms with regard to supporting specific landowner concerns. Before proceeding with the analysis, it is necessary to present the framework that will be used in analyzing the mechanisms.

4.2 Analytical framework

The analysis is intended to be largely descriptive in nature. A list of general criteria was established that would give an indication of the probable landowner acceptability of each mechanism. The criteria chosen are thought to represent many of the primary concerns a landholder has when considering a stewardship program and are based on a review of the literature presented in Chapters II and III and are supported by Smutko et

al. (1984) and Brusnyk et al. (1990). Although the reason for choosing some of the criteria will be obvious, an explanation for each is given.

It is recognized that the framework is not definitive with regard to analyzing landholder acceptability of stewardship mechanisms; however, the list was comprehensive and appropriate for this study. Further, it is recognized that the framework measures acceptability among owners who are receptive towards the use of nonregulatory mechanisms to promote private stewardship and have a positive or open-minded attitude toward wetland conservation. Regardless of the high degree of receptiveness landowners in general have towards nonregulatory mechanisms, and regardless of whether a nonregulatory mechanism meets their concerns, there will be owners who will continue to drain and degrade wetlands due to their negative and firmly-held attitudes toward wetland conservation.

The framework consisting of five criteria is presented below:

1. Strong economic incentives - Landowners are concerned with maximizing returns from their investment in agricultural land. They cannot capture payment for most of the benefits provided by wetlands and so have favored the conversion of wetlands to agricultural uses for economic return. Economic incentives offered to owners for wetland retention must be sufficient to contribute a reasonable return on owner investment. Landholders will not consider wetlands to be an economically viable land use if compensation is not comparable to agricultural production returns that could be achieved given wetland conversion to agricultural uses.

2. Landowner control - This refers to the extent to which landholders retain their property rights and thus retain control over the use of their land. Although the nonregulatory approach to promoting private stewardship

of wetlands is based on convincing property owners to retain wetlands rather than controlling their land management, specific nonregulatory mechanisms can interfere with private property rights. Owners are concerned that stewardship mechanisms allow them ultimate control over private land use decisions through minimal interference with property rights. In the proceeding chapter, it was recognized that mechanisms, such as police power regulation, which interfere with property rights and private land management negatively impact landholders. Retaining property rights allows an owner flexibility in implementing land use decisions which maximize his or her returns to ownership of agricultural land.

3. Flexibility - Landowners are a diverse group with varying farming operations, land uses, economic situations, attitudes, interests, etc. They are concerned that stewardship techniques are flexible in considering their individual needs, farming operations and changing land uses. In the preceding chapter, it was recognized that mechanisms, commonly of a regulatory nature, which are inflexible and prescriptive and thus treat property owners as a homogeneous group without consideration of individual needs, are not acceptable to landowners. Working one-on-one with owners in a cooperative, adaptable manner, empowers them to ensure land use management strategies address their needs and concerns.

4. Certainty - Given recent trends toward drainage and degradation of wetlands for agricultural production, asking landholders to retain wetlands may require a significant change in their land use management strategies. This could have repercussions throughout their operations including impacts on long-term investments in land and capital. With this "commitment" asked of owners, longevity of a program is an important consideration to them.

If they are convinced of the certainty of a program, they may be more willing to make land use and investment changes.

5. Complexity - If a mechanism cannot be understood by landholders then it is too complex. Because owners may be asked to make changes to familiar land use practices which produce known or predictable economic returns, complexity of the mechanism is a concern to them. A mechanism that is not readily comprehended due to a high degree of legal formality, a complex compensation structure, etc., does not instill confidence in the owner to make changes. As a result, it is easier and more reassuring for he or she to maintain the status quo.

4.3 Analysis

Six nonregulatory mechanisms are assessed as to their apparent advantages and disadvantages in supporting the five primary landowner concerns outlined in the analytical framework. For each mechanism, a short description is provided followed by the advantages and disadvantages and a concluding statement regarding probable landowner acceptability.

As stated in Chapter III, there are two general nonregulatory approaches to encouraging private stewardship of wetland environments: 1) market approach, and 2) moral suasion. The market and moral suasion mechanisms chosen for analysis are directly related to promoting wetland retention on private land holdings. They do not represent an exhaustive list of all possible means of encouraging private stewardship, but rather reflect a general set of mechanisms that are mentioned regularly in the literature and which appear to have some merit for encouraging private stewardship of wetlands.

The primary sources of literature used in the identification and description of relevant mechanisms was Haigis and Young (1983), Hoose (1981), Goldsmith and Clark (1990), and Milne (1984).

4.3.1 Market Approach

Market mechanisms endeavor to offer landowners strong economic incentives to forego the benefits of drained wetlands. Implicit in these mechanisms is an educational process to make owners aware of the need to retain wetland environments.

1) Property Tax Incentives

Description - This incentive-based tax mechanism encourages private stewardship by reducing the property tax burden on landholders who retain wetlands. There are two types of property tax incentives: 1) exemption of wetland areas from property taxation, and 2) provision of property tax credits on the owner's tillable land. Exemptions and/or credits are typically offered on a year-by-year basis either through a deduction from the net taxes due or a rebate and are based on the number of qualifying wetland acres the property owner agrees to conserve. Agreements are not legally binding and owners can readily drain or degrade wetlands if they choose; however, they may be required to pay all deferred taxes plus interest.

Advantages - An appealing feature of this mechanism is that landowners retain control over the use of their land. There is no "interest" levied against private property rights through a legal agreement and as such, owners are not obligated to a specific land use. They can make land use changes at any time cognizant of the fact that wetland drainage would result in the foregoing of tax incentives and possibly an

obligation to pay back deferred taxes. Property tax incentives also have the advantage of being easily understood. The administration system for property taxation is well established and is familiar to most owners.

Disadvantages - A major limitation of this mechanism is that it may not offer a landowner strong economic incentives. Offered alone, a property tax exemption on private wetland areas would not provide a significant economic incentive. Tax exemptions are dependent upon the market value of the land and in rural areas, wetlands have a very low assessed value resulting in limited compensation. In central Alberta for example, wetland areas are taxed at an average of about one dollar per acre whereas high quality cropland may be taxed at five dollars per acre (Brusnyk et al. 1990). However, if property tax credits on cropland are offered in addition to tax exemptions, the compensation provided may be significant enough to appeal to owners. The level of compensation is dependent upon the tax credit rate and the acreage of private wetlands retained (usually for every one acre of wetland retained there is a credit applied to one acre of tillable land). If the rate is low and/or the acreage of wetland retained is small, compensation will be limited.

Another major disadvantage to this mechanism is its lack of flexibility. All landowners, regardless of their individual needs, operations and current land uses are offered the same nonnegotiable terms (for example, incentives on a year-by-year basis and wetlands retained in a natural state with no level of agricultural use allowed). The certainty of property tax incentive programs is questionable as well. Tax incentive programs can be expensive for provincial governments and thus are vulnerable to fluctuations in the economy. This funding uncertainty

combined with the one year period agreements offered to owners may result in their questioning the longevity of the program.

Conclusion - Property tax incentives which offer strong economic incentives will likely have moderate appeal among landowners. The advantages of adequate compensation combined with the owner retaining control over land use decisions are offset by the inflexibility and uncertainty of the mechanism as well as the possibility of having to pay back all deferred taxes if wetlands are drained. Property tax incentives which do not offer adequate compensation will likely have high owner acceptability in the short term. A large number of landholders who have opted to retain wetlands will take advantage of the property tax incentives knowing they can convert the area into an agricultural use when needed without heavy penalty. If deferred taxes must be returned, the amount will be restricted to the negligible tax exemption and\or credit received. In the long term, the lack of strong economic incentives and the inflexibility with regard to allowing compatible agricultural uses will push most landowners to opt out of weak tax incentive programs in favor of converting wetlands into uses that offer economic returns. As an exception, there may be a select group of landholders who place a very high value on the non-cash benefits of wetlands. They are not concerned about the level of compensation offered nor the requirement for leaving the area natural without the flexibility of incorporating compatible agricultural uses such as haying and grazing.

2) Management Agreements

Description - This mechanism involves the landowner voluntarily entering into a legally binding agreement with the Crown or conservation

agency in return for financial compensation. By the agreement, the owner is obligated to manage his or her property in a specific manner for a stated period of time to achieve a desired goal such as wetland retention. Economic incentives can be in the form of direct cash payment, the provision of technical services and materials such as fencing and seed necessary to implement the agreed-upon land use management schemes, or a combination of both. The basic premise of management agreements remains even though details of each agreement may vary with regard to length of term, compensation value and schedule, and management of land in the program including the amount of agricultural use permitted.

The legal agreement or contract gives the Crown an enforceable "interest" in the landowner's property over the duration of the agreement. This "interest" can be expressed in a caveat registered on the owner's Land Title and is not binding on future buyers. Typically, the landholder is free to do whatever he or she wants with the land once the agreement period is over or the incentive payments are no longer paid. Many agreements have a cancellation clause which provides for either party backing out via a mutually agreed upon term of notice. If an agreement is terminated by unauthorized land use such as wetland drainage, future compensation to the owner is usually withheld and he or she may be required to pay back that portion of the compensation already received.

Advantages - The major advantages of this mechanism are its flexibility and potential offering of strong economic incentives. Management agreements typically offer the landowner a choice with regard to the length of the agreement (usually 5-20 years), compensation payment schedule (one lump sum payment, annually, every five years, etc. depending on length of agreement), agricultural use permitted in the wetland area

(ranging from no level of agricultural use to unrestricted haying or grazing), and level of wetland development or enhancement. Regardless of agreement terms, economic incentives are usually designed to offer strong compensation to the landholder. For example, owners foregoing all agricultural uses in the wetland area would receive greater compensation than those opting for modified haying or grazing which bring cash returns. An appealing feature of the compensation package is that it does not have to be strictly cash. Owners who have agreed to some level of agricultural use or wetland enhancement can receive adequate compensation through the provision of technical services or materials.

The legal agreement which gives the Crown an "interest" in private property rights would seem to limit owner control. However, the cancellation clause in management agreements allows landowners to readily back out of their obligation to a specific land use. This flexibility in cancelling the "interest" in their property rights ultimately gives them control over land use decisions.

Disadvantages - Management agreements can be limited by their potential for complexity. The legal terminology of the agreement including the registered caveat, the many different agreements a landowner can enter into, and the incentive package including compensation calculation and payment schedule can result in poor landowner understanding. The longevity of management agreements may be questioned as well. Although agreements can be lengthy, the administrator of the program can take advantage of the cancellation clause and terminate the agreement at any time given adequate notice. As well, with its offering of strong incentives, this mechanism is expensive to administer and thus vulnerable to changes in the economy.

Conclusion - Management agreements, with their potential for strong economic incentives coupled with a high degree of flexibility including the owner's option to cancel the "interest" in the land at any time, should appeal to a broad spectrum of landholders with diverse farming operations, land uses, and financial needs. High acceptability of this mechanism will likely be tempered by the need to enter into a formal agreement. Regardless of the cancellation clause in management agreements which assures owner control, there will likely be many owners who will not approve of the mechanism because it involves signing a document and possibly registering a caveat on the Land Title. According to Van Patter et al. (1988), there tends to be a psychological barrier among landowners when it comes to signing a written agreement. As well, acceptability will probably be affected by the complexity of management agreements. Recently, there have been attempts to make the agreements more "landowner friendly" such as through the use of non-legal terminology, in an effort to attract the attention of those owners who do not participate due to a lack of understanding.

3) Leases

Description - Through leasehold, a landowner grants to a tenant, in this case the Crown or conservation agency, exclusive possession of his or her property for a fixed period of time in return for rent. This gives the tenant absolute right to and control over the property during the term of the lease, provided the conditions of the lease are observed. The specific terms and condition of a lease can vary with regard to land use activities allowed by the tenant, duration of the lease, rent payable, and so on. Rent is usually in the form of cash, payable on an annual basis.

The lease is a legal contract giving the tenant an enforceable "interest" in the landowner's property over the term of the lease. This "interest" is commonly registered by caveat on the owner's Land Title and is not binding on future buyers of the property. Lease agreements can provide for either party withdrawing from the terms of the lease given adequate notice, adequate being defined by both parties. Commonly, a penalty clause is included in the lease; thus, landholders who terminate a lease are liable for all advanced rental payments and all costs associated with lessee upgrading of the land such as fencing (Weatherill 1990).

Advantages - A significant advantage of this mechanism is that rental rates can be set high enough so as to offer landowners strong compensation. The Prairie Pothole Project in Saskatchewan, for example, has established competitive rental rates based on the average annual cropland rental price (Scace and Associates Ltd. 1989). Leases also have the advantage of being flexible with regard to the length of agreement and payment schedule. As well, they are easily understood by owners because they tend to exist in standard form which is well established and a familiar way of doing business in rural areas. Because lease agreements are common in rural areas, owner perceptions regarding longevity may be positive.

Disadvantages - A major disadvantage of this mechanism is the potential it has for limiting landowner control. Much like management agreements, owners are given the flexibility to cancel the "interest" in their land thereby assuming exclusive possession and control over land use decisions. However, the penalty clause in leases may make it impractical, from a cost perspective, for many landholders to terminate a lease. As a result, they must continue to surrender certain property rights for the

length of the lease agreement. The exclusive possession clause in favor of the lease holder is also another limitation because it reduces land use flexibility. Owners are not given a choice as to the level of land use they are interested in retaining. They either opt in favor of the lease and give up all use of the land or reject the lease and use the land as they see fit.

Conclusion - It is probable that this mechanism will have moderate appeal among landholders. Strong economic incentives, longevity and ease of understanding offered by lease agreements is offset by the disadvantages associated with the penalty and exclusive possession clauses. Many owners may feel that the disadvantages are significant enough to outweigh the many advantages.

4) Conservation Easements

Description - A conservation easement is a legal means whereby landowners can voluntarily restrict the present and future use of their land by selling partial rights to their property. Through the granting of a conservation easement to a party concerned with wetland retention, an owner surrenders certain property rights and thus restricts the realm of land use activities on his or her property. Under Canadian Law, a conservation easement must be held by a government or an agency of the government. By acquiring an easement, the Crown is able to control only those property rights that the landholder could use to destroy and degrade wetland environments. The owner retains title to the property and all rights not specified in the easement as well as responsibilities associated with property ownership. The responsibility of the recipient of an

easement is to ensure that restrictions on land use set forth in the easement are not disregarded now and in the future.

Conservation easements vary with regard to the type of property rights surrendered by the landowner and the size of property restricted in use. One may place all of one's holdings under easement or just the portion that has greatest significance from a wetland conservation perspective. Payment for the easement is usually determined by subtracting the assessed value of the property with the land use restrictions specified in the easement from the assessed value of the property with no land use restrictions.

Easements are registered on Land Title and "run with the land", legally binding present and future owners. They can be granted for a specific term or in perpetuity thus affecting everyone who will ever own the property regardless of whether it is transferred by sale, donation or bequest. Perpetuity, however, is not necessarily timeless as most easements have a reverter clause stating that if the purpose behind the easement is ever abandoned, the easement goes back to the land title holder.

Advantages - A major advantage of this mechanism is that the value of an easement can be established at a high monetary rate in order to offer landowners strong economic incentives. Easements are also perceived as having a high level of certainty due to the legally binding agreement which restricts present and future land use. The high level of certainty associated with easements may be considered advantageous by some landholders and limiting by others. Although longevity of a mechanism is appealing to owners, easements granted in perpetuity may go beyond the bounds of what many consider to be a reasonable time period.

Disadvantages - There are two significant disadvantages to this mechanism: loss of landowner control and little flexibility. Landholders are required to surrender partial property rights and thus are obligated to a specific land use. Present and future owners are legally tied to this land use obligation for the term of the easement which is usually in perpetuity. The only flexibility the easement may offer is in the type of private property rights surrendered. An easement may restrict all agricultural use, leaving the wetland area natural or it may allow partial agricultural uses.

Complexity of easements may be a problem as well given the legal documentation and caveat that "runs with the land".

Conclusion - Landowner acceptability of this mechanism will likely be low. The permanent loss of property rights and the restrictive nature and longevity of easements more than offsets the offering of a strong economic incentive. Easements which allow limited agricultural uses versus none will probably have greater acceptance because it leaves the present owner and prospective buyers with a reasonable economic use for the land. This mechanism may appeal to a select group of individuals who value their wetlands and want to preserve them into the future. They are not concerned with the disadvantages of easements, but are interested in the longevity of the mechanism and the resultant protection of wetlands for many years to come.

4.3.2 Moral Suasion

Moral suasion mechanisms attempt to convince landowners to voluntarily forego the economic benefits of wetland drainage without financial compensation.

1) Landowner Education

Description - This mechanism involves providing information to landowners in a effort to make them aware of the values that wetlands provide, the relative importance of particular types of wetland environments, rate of wetland loss, what they can do to protect this resource, and so on. Such educational initiatives can promote private stewardship by directing landholder attention to the need for wetland protection and guiding private conservation efforts. The provision of information for educational purposes does not include the owner entering into an agreement, either verbal or written, to retain wetland environments.

Two important means of disseminating information include: 1) educational outreach programs which involve contacting individual landowners directly to provide wetland information of a general and/or site-specific nature, and 2) extension programs which offer individual landowners technical assistance with regard to site-specific land management techniques for wetland protection. Outreach and extension programs need not be mutually exclusive, but can operate concurrently to encourage private stewardship.

Advantages - The advantages of this mechanism are many. Educational programs are easily comprehended by landowners. All property rights remain with them giving them control over all land use decisions. Rather than providing all owners with a generic package of information, educational outreach and extension programs can be responsive to a broad spectrum of property owners through the provision of site-specific information. Longevity of this mechanism should not readily be questioned. Due to lower administration costs than other stewardship mechanisms,

education programs are not as vulnerable to fluctuations in the economy. As well, after initial landowner contact, many owners may not request further information.

Disadvantages - Although it is recognized that the intent of educational programs is to convince landholders to preserve wetlands without benefit of compensation, this lack of economic incentives is a significant disadvantage.

Conclusion - Through educational programs, there will likely be a large number of owners who will continue to protect wetland areas as they have in the past. The provision of information does not change their situation. They have opted to retain the wetland knowing that land use can be changed at any time if need be. However, it is probable that most landowners continuing to protect wetlands will only do so in the short term due to the lack of strong economic incentives. Over a longer time frame, it will be difficult convincing a large number of owners to place a high value on the non-cash benefits of wetland environments and thus forego economic compensation. They can be convinced of the need for wetland protection but this stewardship ethic will be weighted against the need to drain wetlands in order to realize returns from their investment in agricultural land. A recent study which determined factors affecting landowner participation in a prairie stewardship program concluded that "while farmers expressed concern about the environment, the adverse effects of current agronomic practices and the destruction of wildlife habitat, economic realities often caused them to behave in a fashion that was opposed to their own value system" (Van Kooten and Schmitz 1990, p95). An exception may be a select few individuals who place a very high value on

the non-cash benefits of wetlands and thus favor wetland conservation in their land use decisions.

2) Landowner Recognition

Description - This mechanism involves formally recognizing individual landowner efforts in retaining wetlands. Inherent in a recognition program is an owner education process. To participate, an owner agrees, verbally or in writing, to protect and maintain specific wetlands on his or her property and give notice in case of change in land use or ownership. In recognizing their contribution to conserving wetland environments, they are presented with a symbol such as a wall plaque, certificate, yard sign, or name publication in the local newspaper. No payment is offered for capital costs associated with wetland maintenance or improvements. The verbal or written agreement is moral, not legal. Thus, it is not binding and does not affect the deed, allowing the landowner to back out at any time.

Advantages - Landholder control is a significant advantage of this mechanism. Although an owner enters into either a verbal or written agreement, no "interest" is levied against their property rights obligating them to a specific use. The agreement has no set time limit and can easily be broken through a change in land use. Recognition programs also have the advantage of being easy to comprehend since agreements are informal and straight forward with no legal jargon. As well, owners should perceive the mechanism to have longevity due to low administration costs.

Disadvantages - As with education programs, the major limitation of this mechanism is its lack of landowner compensation. Inflexibility is also another disadvantage. Landholders are typically only

recognized for maintaining wetlands in a natural state and thus are limited to this one land use with no option to incorporate compatible agricultural uses.

Conclusion - As in the case of educational programs, owner acceptability of this mechanism will likely be high in the short term. A large number of landholders who have opted to retain wetlands will continue to do so under a recognition program knowing that they can convert the area to agricultural uses at any time if needed. Due to the psychological barriers associated with written agreements, verbal agreements will probably attract more landholders even though both have the same degree of owner control. In the long-term, it is probable that most owners will opt out of a recognition program. The inflexibility with regard to allowing compatible agricultural uses and the lack of strong economic incentives does not leave wetland areas economically viable. As in education programs, conservation minded landowners will have difficulty giving the same weight to a stewardship ethic as to the need to maximize investments in agricultural land. The exception will be those few who place a very high value on the non-cash benefits of wetlands.

4.4 Summary

This chapter analyzed six market and moral suasion nonregulatory mechanisms commonly used to promote private stewardship of wetlands. An analytical framework was established to assess the apparent advantages and disadvantages of the mechanisms in supporting five primary landowner concerns with regard to stewardship programs. This assessment was used to draw conclusions on the probable landholder acceptability of the mechanisms.

Application of the analytical framework is summarized in Table 1. Results showed that the six mechanisms vary in their support of owner concerns and thus conclusions drawn from these results propose that the mechanisms will likely have varying degrees of landowner acceptability. Conclusions were also drawn to suggest that those individual mechanisms, including property tax incentives and landowner education and recognition mechanisms, which require a minimal land use obligation from the landholders and offer only weak economic incentives will likely decrease in acceptability over time. It was argued that a large number of owners who have opted to retain wetlands in the past will initially support such a nonregulatory mechanism knowing that they can convert the wetland into agricultural production as demanded by their economic situation. Although owners may be convinced of the need to conserve wetlands, in a longer time frame this stewardship ethic will be weighted against the need to realize returns from investment in agricultural land. Figure 2 summarizes, on a scale of decreasing acceptability, the probable landowner receptiveness of the six nonregulatory mechanisms. Where applicable, those mechanisms which are likely to have a change in acceptability over time are indicated.

In the next chapter, the six nonregulatory mechanisms are evaluated for their success in promoting private stewardship of wetlands. This evaluation is based on the actual acceptability of the mechanisms as determined through a review of three case studies.

TABLE 1

A Summary of the Apparent Advantages and Disadvantages of Selected Nonregulatory Mechanisms in Supporting Primary Landowner Concerns

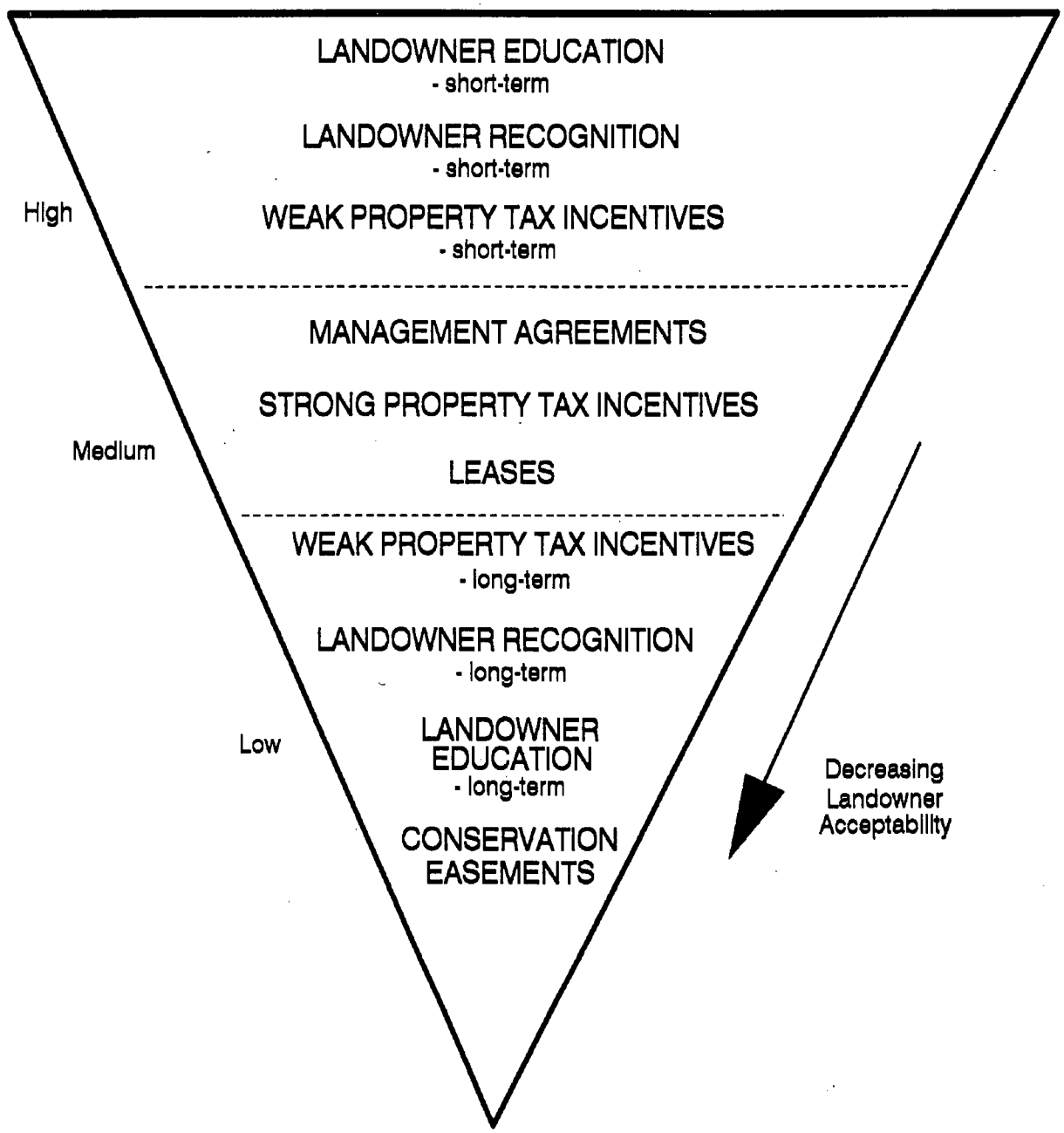
CRITERIA
(Landowner Concerns)

MECHANISMS	Strong Economic Incentives	Landowner Control	Flexibility	Certainty	Complexity
Property Tax Incentives	Weak if tax exemption offered (-) Potentially strong if both exemption and credit offered (+)	Yes (+)	Little flexibility (-)	Questionable (-)	Simple (+)
Management Agreements	Yes (+)	Yes (+)	Very flexible (+)	Questionable (-)	Can be quite complex (-)
Leases	Yes (+)	Potential for limiting landowner control (-)	Terms of the lease are flexible (+) Inflexible exclusive possession clause (-)	Perceived longevity (+)	Simple (+)
Conservation Easements	Yes (+)	No (-)	Little flexibility (-)	Limited by high level of certainty (-)	Can be complex (-)
Landowner Education	No (-)	Yes (+)	Very flexible (+)	Perceived longevity (+)	Simple (+)
Landowner Recognition	No (-)	Yes (+)	Little flexibility with regard to land use (-)	Perceived longevity (+)	Simple (+)

(+) Advantage (-) Disadvantage

Figure 2

Probable Landowner Acceptability of Selected Nonregulatory Mechanisms



V. SUCCESS OF NONREGULATORY MECHANISMS IN PROMOTING PRIVATE LANDOWNER STEWARDSHIP

5.1 Introduction

The purpose of this chapter is to determine how successful nonregulatory mechanisms are in promoting private stewardship of wetlands. Landowner acceptability of nonregulatory tools is a measure of this success. The analysis carried out in Chapter IV gave an indication of the probable landholder appeal of six common nonregulatory mechanisms. This chapter tests the analysis by examining the actual owner appeal of the six mechanisms as implemented in various stewardship programs across Canada. Based on a review of the existing acceptability of the mechanisms in three case studies, their success in promoting landowner stewardship of wetlands is evaluated.

The criteria that will be used to evaluate the success of the mechanisms are presented first.

5.2 Evaluation Criteria

To evaluate the effectiveness of the six nonregulatory tools in encouraging private stewardship, their acceptability to landowners must be determined. Given the purpose of this chapter and limitations imposed by case study data, landowner participation is thought to be a good indicator of acceptability. Thus, to evaluate the mechanisms' success each was measured against the following criteria:

1) Actual rate of landowner participation;

2) Length of participation indicated by:

- length of agreement the landowners entered into (years), and
- number of agreements terminated before end of term;

3) Rate of compliance as indicated by the number of owners violating agreements by unauthorized changes in land use such as draining or degrading wetlands.

4) Change of attitude - In a longer time frame, a positive change in attitude of those owners participating in a stewardship program can be an indicator of acceptability and thus can contribute to evaluating the mechanisms' effectiveness. Where possible, each mechanism was assessed for shifting landowner attitudes towards the notion of wetland stewardship or a wetland conservation ethic. This evaluative criterion is difficult to apply to all the mechanisms due to data limitations imposed by the case studies.

By examining the rate of participation, conclusions can be drawn with regard to the success of the mechanisms in promoting stewardship of wetlands among private landholders. Examining length of participation, rate of compliance and change in attitude will allow conclusions to be made with regard to the success of the mechanisms in continuing to promote stewardship among those owners participating in a stewardship program.

5.3 Evaluation

Existing data from three stewardship programs currently implemented in Canada is used to evaluate the effectiveness of the mechanisms. The three programs were chosen as case studies based on their utilizing one or more of the six mechanisms to encourage wetland retention on private lands (with the combination of the three representing all six mechanisms), and

their having been in place long enough to generate data for the evaluation. The three case studies are as follows: 1) Case study one - management agreements are evaluated based on data from Alberta's Landowner Habitat Project; 2) Case study two - management agreements, leases, property tax incentives, and conservation easements are evaluated based on data from Saskatchewan's Prairie Pothole Project; 3) Case study three - landowner education and landowner recognition are evaluated based on data from Ontario's Natural Heritage Program. For each case study, background information is provided followed by the application of the evaluation criteria and a concluding statement regarding the success of the mechanisms in promoting private stewardship of wetlands.

A number of limitations exist with regard to carrying out the evaluation. Firstly, property tax incentives and conservation easements are not currently utilized in the Prairie Pothole Project to promote stewardship; thus, the evaluative criteria cannot be applied to these two tools. However, the first phase of the Prairie Pothole Project assessed, by way of a landowner survey, a number of nonregulatory mechanisms, including property tax incentives and conservation easements, as to their landowner acceptability. This assessment will be used to draw conclusions regarding the effectiveness of these two mechanisms.

Secondly, because stewardship programs which utilize nonregulatory mechanisms to promote stewardship are not a traditional method of conserving natural areas, they have only been operational for a very short time. The three case studies, for example, have only been in place for about four years. As a result, landowner participation in the long term cannot be determined and thus evaluating the long-term success of the mechanisms in promoting stewardship is not possible. This is a significant

disadvantage given that the analysis in Chapter IV showed some mechanisms likely decreasing in owner acceptability over time.

Thirdly, due to the nature of a landowner education tool which does not require any kind of verbal or written commitment from landowners, it is difficult to apply the evaluation criteria. This limitation will be discussed further under the Natural Heritage Stewardship Program case study.

5.3.1 Alberta's Landowner Habitat Project (LHP)

The following description and results of the Landowner Habitat Project is drawn principally from Brechtel and Anderson (1987), Brusnyk et al. (1990), and Murphy (1990).

1) Background - In 1986, the Alberta Government, with funding support from Wildlife Habitat Canada, initiated a three-year pilot project aimed at preserving wildlife habitat on privately owned lands in selected areas of Alberta. This Landowner Habitat Project was designed to promote land use practices that would benefit both the landowner and wildlife and was modelled after earlier habitat retention programs in Red Deer County which ran from 1978 to 1982. The project was established in the central Alberta Counties of Minburn and Red Deer and the Bow River and Eastern Irrigation Districts in southern Alberta. In the irrigation districts, the LHP focuses on conserving pheasant habitat and thus will not be evaluated in this thesis. Minburn and Red Deer Counties, located in the prairie pothole region of Alberta, are rated among the highest in the province for potential waterfowl production but also have considerable and continuing losses of habitat including wetland drainage and degradation due to intensification of agriculture.

At the outset of the LHP, existing woodland and wetland habitats in Minburn and Red Deer Counties were evaluated and priorized. The owners of high quality habitats were individually contacted and encouraged to enter into a management agreement. Management agreements under the LHP offer various monetary incentives to landowners to alter their land management strategies in ways that benefit wildlife. The agreements are flexible with regard to length of term (5-50 years) and amount of agricultural use permitted with incentive payments being made annually or in five-year increments. Caveats are registered against the land title for the term of the agreement and an opting out clause is available. This clause is not as flexible as other management agreements in different programs, and only gives an owner the opportunity to opt out every five years. If an agreement is terminated by unauthorized land use, incentive payments already received by the landowner have to be repaid.

In determining incentive payments, efforts were made to have them closely reflect the potential agricultural return available to owners from their habitat areas. Compensation is based on the landowner's use of the land and the degree to which he or she is willing to forego agricultural production in favor of maintaining wildlife habitat. Maximum incentive payments are calculated at 80 percent of the mean annual land rental rate for five categories of land use: cultivated lands (cropland, summerfallow, seeded hayland), improved pastures (seeded forage or hayland), native pastures, and woodland and wetlands on which grazing is the dominant use. The maximum compensation rates for these land categories are then modified by the extent to which the owner foregoes agricultural production. For example, if the owner opts for the "no agricultural use option", the land is used solely for wildlife habitat and he or she will receive the maximum

incentive payment. This compares to the "modified agricultural use option" which allows agricultural uses compatible with retaining wildlife habitat. In this situation, the owner receives 50 percent of the maximum incentive payment. For those landowners having quality upland nesting cover around wetlands, maximum incentive payments are modified according to the ratio of nesting cover retained in a natural state to water covered area. For example, an owner conserving a three-to-one ratio of nesting cover to water area will receive the maximum incentive. This is reduced to 60 percent of the maximum if the ratio is one-to-one.

2) Results -

Rate of participation - Up to January 1989, 82 landowners in the Counties of Minburn and Red Deer have entered into 97 LHP management agreements covering 16,741 acres. The 82 landowners signing agreements represents approximately 30 percent of those owners personally contacted and encouraged to enter into an agreement. Those owners participating cite program flexibility (in terms of type, duration of agreement, cancellation clause, and level of agricultural use), personal interest in long-term habitat protection, and economic incentives as the main features of the LHP that influenced their decision to participate.

In 1989, a survey of LHP participants and non-participants was carried out in order to assess the effectiveness of the program. Ninety three percent of LHP participants were surveyed as well as 82 non-participants. When asked about future participation in the program, approximately half of the non-participants indicated they would enter into agreements, one-quarter were undecided and one-quarter said they would not likely participate. Reasons were not given as to why non-participants do

not favor the program; however, when participants were asked to cite the disadvantages of the program, those that did indicate there were disadvantages said the agreements restricted land uses and farming operations and could increase wildlife-related crop damage and hunting related problems. These disadvantages may be the cause for many non-participants continuing to ignore the program.

Length of participation - The duration of the management agreements the landowners entered into is one good indicator of their commitment to the program. Six management agreement terms are offered, ranging from 5 to 50 years. Overall, 20-year terms comprise the majority of the agreements signed and reflect landowner interests in longer-term wetland protection. The remaining agreements are predominantly for 5- and 10- year terms with very few agreements exceeding 20 years in length.

The number of agreements terminated before end of term is a second indicator of length of participation. The termination rate of management agreements has not been an issue in the LHP. Up to August, 1990, the number of landowners opting out of agreements has been minimal and predominantly due to a change in land ownership. The 1989 survey results indicate approximately 90 percent of the landowners are either very satisfied or satisfied with the program including the level of compensation.

This low rate of agreement termination and high level of owner satisfaction must be tempered by the fact that the LHP has only been operating since 1986. Although termination of agreements may not become a concern in the immediate future, changing economic status and land ownership over the long term may cause some landowners to opt out of agreements.

Rate of Compliance - Since LHP start-up, few landowners have violated management agreements by unauthorized land use changes. Program coordinators have typically had to deal with one to two landowners per year who have not complied with agreement terms. In some of these cases, noncompliance was the result of owner misunderstanding with regard to the terms of the agreement and was easily corrected.

Change in attitude - The 1989 LHP participant survey also assessed if the program had influenced landowner attitudes toward conserving wildlife habitat. Survey results indicate that approximately two-thirds of the landholders strongly agreed or agreed that participation in the program has resulted in a positive attitude change towards habitat conservation. The remaining one-third of participating owners indicated that they already had a conservation ethic before entering into an agreement.

3) Conclusion - The analysis in Chapter IV indicated that management agreements would likely have a moderate to high acceptability among landowners as a result of adequate compensation, retention of owner control, and flexibility with regard to length of term and level of agricultural use. The evaluation indicates that LHP management agreements only have a 30 percent landowner participation rate; a level of appeal that is not consistent with results from the analysis. Based on this 30 percent level of participation, it can be concluded that the success of the LHP agreements in promoting private stewardship of wetlands among landowners is limited.

Participants have cited adequate economic incentives and flexibility with regard to length of term and permitted agricultural land uses as

positive aspects of the agreements. Given this, it is likely that the requirement of a caveat registered against title and a very restrictive cancellation clause creates a LHP management agreement that is less attractive than other management agreements offered under different programs. The restrictive cancellation clause is a particularly weak aspect of the agreement. Because it only allows a landowner the opportunity to cancel out of the agreement every five years, he or she is obligated to a specific land use for a set period of time thus limiting their control over the use of their land. This loss of owner control was alluded to in the 1989 landowner survey when participants cited restricted land uses and farming operations as a disadvantage of the management agreements.

Although participation has been lower than anticipated, the acceptability of the LHP among those landowners supporting the program through the signing of agreements is more consistent with the analysis. The positive change in landowner attitudes towards a conservation ethic, the negligible rate of agreement termination and violation, and the preference for 20-year terms indicates that the LHP has been well accepted by participating owners. These results must, however, be viewed with caution given the 5-year age of the program. As the management agreements move closer to maturity, longer-term information will become available as to the percentage of participants opting out of or not complying with agreements and the percentage of landowners renewing their agreement after the current one has lapsed. In spite of this limitation, the owner commitment shown so far towards the program indicates that the LHP has, since implementation, been successful in continuing to promote private stewardship of wetlands among participating landowners.

5.3.2 Saskatchewan's Prairie Pothole Project (PPP)

The following description and results of the PPP is drawn principally from Melinchuk and MacKay (1986), Russell and Howland (1988), Duncan (1990) and Van Kooten and Schmitz (1990).

1) Background - In 1985, the Saskatchewan Government, with funding support from Wildlife Habitat Canada and the Canadian Wildlife Service, initiated the Prairie Pothole Project. The principal objective of this pilot project is to identify, apply and evaluate methods of protecting wetlands on private land in rural Saskatchewan. The target area for the PPP is the Rural Municipality of Antler in Southeast Saskatchewan. This municipality has rich, black productive soils and a high density of potholes making it a highly productive waterfowl habitat. Ninety-six percent of the area is privately owned with 80 percent intensively managed for the production of cereal grains. Continuing losses of wetlands and associated uplands to agricultural production is typical of the area; however, its value to waterfowl has not yet been eliminated.

The Prairie Pothole Project has two phases. Through a landowner survey, Phase I assessed owner receptiveness to a variety of options which could be used to secure long-term protection of wetlands on private landholdings. Licenses (management agreements), leases, property tax incentives, and conservation easements were some of the many options included in this assessment phase. Producers indicated that they preferred management agreements and leases as methods for encouraging wetland conservation. Phase II, the implementation and evaluation stage of the project endorsed in 1986, is a five-year, 1.7 million dollar stage designed to deliver and evaluate several of the options assessed in Phase I. During the implementation stage which ran from 1986 to February, 1988, management

agreements and leases were the primary mechanisms used by project coordinators to promote private stewardship of wetlands. This reflects landowner preferences recorded in Phase I.

Management agreements were utilized to secure native habitat complexes which were generally defined to include all uncultivated uplands (including hay and pasture) and wetlands containing emergent native vegetation. Letters announcing and explaining the program were mailed to all landowners in the municipality. Those interested in entering into a management agreement were invited to contact project staff who then evaluated the individual owner's property to determine if selection criteria were satisfied. If so, the landowner was approached to negotiate the agreement.

Management agreements under the PPP offered landowners various monetary incentives to alter their native land management strategies in ways that benefit wildlife. Owners were given a choice of either 5- or 10-year terms, up-front incentives are paid out once a year prior to the season covered by the agreement, and agreement terms were flexible with regard to the amount of agricultural use permitted. Unlike the management agreements offered under the Landowner Habitat Project, all PPP agreements, regardless of the length of term, have a 90 day cancellation clause to promote landowner acceptance and no caveat was registered against the title.

Incentives offered were determined through a scaled lease fee structure based on the terms of the agreement including length of term, degree of agricultural use maintained and ratio of upland to wetland retained. The fee structure was intended to promote longer term agreements, preserve idled native habitats and encourage a high upland to

wetland ratio. Maximum incentive rates are $10/acre/year (based on average pasture rental rates for the area) and were offered to landowners entering into a 10 year, no agricultural use, 3:1 upland to wetland ratio agreement. The fee schedule is as follows:

FEE SCHEDULE FOR MANAGEMENT AGREEMENTS

($/acre/year)

			Idled*		
	Utilized**	Modified***	1:1****	2:1	3:1
Term:					
5 years	$2.00	$2.50	$4.00	$6.00	$8.00
10 years	$3.00	$3.75	$6.00	$8.00	$10.00

* No agricultural use permitted; landowner is required to set aside at least 15 acres of wetlands plus an equivalent or greater amount of uplands.

** Unrestricted haying or grazing permitted.

*** Modified use restricts haying or grazing dates until July 15 or June 20 respectively.

**** Upland to wetland ratio.

The project utilized leases to secure 40 acre cultivated parcels for purposes of establishing dense nesting cover. Landowners having flat cultivated 40 acre parcel blocks around wetlands were contacted and encouraged to lease the parcels for a 10-year term to be renegotiated every three years. There was no flexibility with regard to length of term offered to the owners and they are unable to opt out of the lease before the term is complete. Having the owner lock in for ten years protects the government's investment in materials and labor. Landowners entering into a lease agreement receive $30/acre/year based on the average annual cropland rental price in the general area and have a caveat registered against their

title. At renegotiation, the rental price is examined and adjusted to ensure the landowner is adequately compensated. The PPP retain exclusive possession of the parcel which allowed project coordinators to enclose the area with an electrified fence and seed to nesting cover.

2) Results -

Results of the PPP are divided into two separate sections: Phase I and II. Phase I reports landowner receptiveness to conservation easements and property tax incentives based on the landowner survey. Phase II reports landowner participation, as measured by the evaluation criteria, for management agreements and leases.

Phase I - Eighty-seven landowners in the Rural Municipality of Antler were surveyed in order to assess their receptiveness to a variety of nonregulatory mechanisms. These 87 landowners represent 68 percent of the study area's 198 landowners and 77 percent of the study area's land base.

Of the landowners canvassed, the majority (77%) indicated they preferred management agreements and leases as methods to secure long-term protection of wetlands. As a second choice, only 9 percent favored the use of conservation easements. This mechanism was criticized as being too binding and restrictive to farming operations.

With regard to property tax incentives, survey data indicate that 31 percent favored the use of a property tax exemption on wetland areas in return for an agreement to conserve these areas. It was recognized by many landowners that a property tax exemption on wetlands without inclusion of a property tax credit on tillable land results in poor compensation. Those landowners rejecting the use of property tax exemptions to promote stewardship cited the following reasons: poor compensation, too much

government bureaucracy, too much extra bookwork, and the Rural Municipality of Antler, as the proposed administering body, may not be fair and just.

These survey results indicate landowner acceptability of weak property tax incentives over a longer term. The Ontario Conservation Land Tax Reduction Program, initiated in late 1988, gives a very general indication of the short-term acceptability of this mechanism. This new program offers landowners of highly significant conservation lands a rebate on the municipal property taxes levied against those lands. The rebate equals 100 percent of the taxes paid on eligible lands up to a maximum of 25,000 per landowner over the course of the program. Owners ceasing to maintain the conservation lands in their natural state must repay an amount equal to the total rebates received by all owners during the previous ten years plus interest at the rate of 10 percent per year, calculated annually. Those landowners eligible for a tax rebate for 1987 and 1988 must have their application into the Ontario Ministry of Municipal Affairs by December 31, 1990. According to the Ministry of Municipal Affairs (1990), the program is very popular among landholders. As of early October, 1990, the number of applicants for the rebate have exceeded expectations by approximately 75 percent.

Phase II -

Rate of participation - During the implementation stage of Phase II, 45 percent of all landowners in the Rural Municipality of Antler entered into management agreements. In total, 13,550 acres of native habitat were secured via agreements which represents approximately 30 percent of the total eligible native habitat in the study area. Of the landowners entering into agreements, almost two-thirds opted to retain full utilization of the area (unrestricted haying or grazing permitted), one-

quarter were willing to idle their land (no agricultural use permitted) and only 12 percent opted to modify present land use practices (restricted haying or grazing). An agreement that allows full utilization of the area was favored because it allows the landowner maximum flexibility with regard to land use as well as the highest potential income. Although the fee schedule pays less to those owners opting for fully utilized agreements, they can "double-up" their income by renting the land to ranchers while receiving payments from the PPP.

Lease efforts were directed toward securing 40 acre cultivated parcels for dense nesting cover from 26 landowners in the study area. By the end of the implementation stage of the project, 31 percent of those 26 landowners had entered into a lease agreement. Cultivated parcels leased included better and more marginal agricultural lands. Those landowners not signing leases were critical of the lease payments, fragmented quarter sections and the inconvenience and cost of farming the extra corners that resulted from leasing a 40 acre parcel. Although lease payments are based on the average annual cropland rental price in the general area, they do not include costs associated with increased fuel and labor to make turns around the extra corners and they are too low for those landowners having above-average agricultural land (based on assessed tax value).

Length of participation - Landowners entering into management agreements had a choice of either 5- or 10-year terms. Approximately 60 percent of the owners opted for the 10-year term. Although this statistic can indicate landowner commitment to the project, it must be recognized that limitations exist given the manner in which the agreements were secured. The 90 day cancellation clause, emphasized in negotiations as a "user-friendly" feature of the mechanism, was made available to landowners

regardless of the length of agreement they entered into. This clause favors the 10-year agreements over the 5 because it offers owners more money without a greater level of commitment.

Up to December 1990, termination of agreements has been negligible. Because most of the owners signing agreements opted to retain full agricultural utilization of the wetland area, there is minimal interference in their agricultural operations leaving little reason to opt out of the agreement. Some owners who signed agreements which prohibited agricultural uses came back to the project coordinators to renegotiate for more flexible terms which allow some agricultural use of the area. This renegotiation was particularly prevalent during drought years.

With regard to leases offered by the PPP, length of participation as indicated by agreement term and agreement termination is not an issue. Landowners signing leases had to enter into a 10-year agreement without option for termination.

Rate of Compliance - Up to December, 1990, the number of owners violating management agreement terms has been virtually nonexistent due to the prevalence of "full agricultural use" agreements as well as project coordinators allowing the land use terms of agreements to be renegotiated.

Landowners violating lease agreements by unauthorized changes in land use is not an issue because exclusive possession of the leased parcel goes to the PPP who take responsibility for land use. Once the parcel is fenced, converted to dense nesting, and managed accordingly, it would be very difficult for the owner to violate the lease agreement.

Change in attitude - The evaluation phase of the PPP has yet to assess the number of landowners currently with management or lease agreements who have had a shift in attitude towards a stewardship ethic. A

socioeconomic evaluation of the project focussed on those factors affecting landowner participation. Results indicate that a positive attitude toward the project and waterfowl habitat conservation are not significant factors in encouraging owner participation in management agreements or leases. Given these results, many of the landowners entering into agreements did not have a strong conservation ethic and further assessment is needed to determine if they have had a change in attitude.

3) Conclusion -

Phase I - The analysis carried out in Chapter IV indicated that the probable landowner acceptability of conservation easements would be low as a result of lost property rights, inflexibility and longevity. The analysis also suggested that strong property tax incentives would likely have only moderate acceptability among landowners due to inflexibility and the resultant treatment of landowners as a homogeneous group. Weak property tax incentives would likely have high owner appeal initially, decreasing to low appeal in the long term due to the limited financial support given to landowners. Because these mechanisms are not utilized in the PPP, these hypothesis cannot be tested through application of the evaluation criteria. Results of the PPP assessment of landowner acceptability towards conservation easements and property tax incentives is, however, used as a comparison to the literature-based analysis and allows general conclusions as to the success of these mechanisms in promoting private stewardship. The assessment does not allow conclusions to be drawn with regard to the success of these mechanisms in continuing to promote stewardship among those supportive landowners cannot be made.

Results of the PPP assessment of landowner receptiveness to conservation easements is consistent with the analysis. Assessment results indicate a low level (9%) of acceptability among surveyed landowners in the study areas for reasons cited in the analysis. From these results, it can be concluded that the success of this mechanism in encouraging stewardship of wetlands among private landholders is very limited.

Because the PPP assessment of property tax incentives focused on the exemption of wetland acres rather than a credit of tillable acres, only conclusions as to the success of weak property tax incentives can be made. The assessment indicates that long-term property tax exemptions for wetland areas have a 31 percent acceptance rate among surveyed landowners. This lower level of owner appeal is consistent with the analysis and from these results it can be concluded that, over a long time frame, the success of weak property tax incentives in promoting private stewardship of wetlands among landowners is limited.

Although assessed owner appeal of weak property tax incentives was consistent with the analysis, surveyed owners who did not favor this mechanism gave reasons for their rejection which were not completely consistent with the analysis. Rather than citing inflexibility which the analysis flagged as a major disadvantage of this mechanism, owners cited government bureaucracy and mistrust of local government as an administering body as reasons for rejection. This attack on government may be the result of its long-term role in property taxation or owner perception of the Rural Municipality of Antler's present political representatives not meeting their interests.

Very preliminary results from the Ontario Conservation Land Tax Reduction Program support the analysis with regard to short-term landowner

acceptability of weak property tax incentives. Although this result gives a very general indication of owner acceptability, it does suggest this mechanism can be successful in encouraging private stewardship over a short time period.

Phase II - The evaluation of PPP management agreements indicates that 45 percent of all landowners in the study area supported this mechanism. When compared with LHP management agreements, this rate of participation is 15 percent higher and more consistent with the moderate to high probable landowner acceptability rating from the analysis. Based on these results, it can be concluded that the PPP management agreements are moderately successful in promoting private stewardship among landowners.

Since both PPP and LHP management agreements offer the landowner adequate economic incentives and flexibility with regard to land use, the higher rate of owner appeal among PPP agreements versus LHP agreements may be due to the fact that PPP agreements have a 90 day rather than 5-year cancellation clause and no caveat is registered against title. This 90 day cancellation clause is particularly appealing to owners because it readily allows them to back out of their obligation to a specific land use and thus, does not limit their control over land use decisions.

The evaluation also indicates that the acceptability of the PPP management agreements among those landowners holding agreements is consistent with the analysis. Although change in owner attitude towards a stewardship ethic has yet to be assessed, the negligible rate of termination and violation as well as a preference for the 10-year length of term suggests that the management agreements offered by the PPP have been well accepted by participating landowners. These results must however, be viewed with caution because the project has been in place only a short time

and the structure of the agreements favor the 10-year term over the 5. Only as time passes will longer-term information be made available as to the percentage of participants opting out or not complying with agreements as well as the number of landowners renewing their agreements once the current one has lapsed. In spite of this limitation, the owner commitment shown so far to the project indicates that the management agreements have, since implementation, been successful in continuing to promote private stewardship of wetlands among participating landowners.

The analysis in Chapter IV indicated that lease agreements would likely have only moderate acceptability among landowners because of the disadvantages associated with this mechanism including limited owner control and exclusive possession by the lessee. The evaluation indicates that PPP lease agreements have a 31 percent landowner participation rate: a level of owner appeal that is only slightly lower than what was suggested in the analysis. Based on this result, it can be concluded that the success of this mechanism in encouraging private stewardship of wetlands is limited.

Although the actual owner appeal is consistent with the analysis, the disadvantages of this mechanism, as cited by landowners approached to enter into a lease agreement, were not consistent with the analysis. Owners were more concerned with adequate compensation for leasing quality agricultural lands and minimizing fragmentation of quarter sections than with limited control over their land base or exclusive lessee possession.

The success of PPP lease agreements in continuing to promote private stewardship among participating landowners is difficult to determine because of the structure of the leases. Because owners had to lock into a 10-year agreement without the ability to cancel the lease, their commitment

to the lease over a long time frame cannot be established. As well, owner violations of the agreement are very difficult to carry out given the exclusive possession clause. If the project offered varying terms to the owners with the flexibility to cancel the lease, landowner commitment could be more readily established. This is particularly true if the landowner could opt out of the agreement without having to pay for the lessee costs incurred to upgrade the land. If an owner is liable for costs upon termination of a lease, he or she may be much more reluctant, from a cost perspective, to opt out of the agreement.

5.3.3 Ontario's Natural Heritage Stewardship Program (NHSP)

The following description and results of the NHSP is drawn principally from Moull (1987 and 1990), and Rzadki et al. (1988).

1) Background - The Natural Heritage Stewardship Program is a research and outreach project sponsored by the Ontario Natural Heritage League. The League is a loose coalition of 28 government and non-government groups concerned with the protection of Ontario's natural heritage areas.

The NHSP began in 1984 as strictly an educational outreach pilot project. Private landowners of important natural areas across southern Ontario were contacted directly and informed of the significance of their land. Several of the target sites were wetlands. Due to the trial basis of this educational approach to encouraging private stewardship, the provision of technical information through extension services was not employed.

In 1985, the NHSP adapted the educational outreach approach to the Carolinian Canada project initiated by the Natural Conservancy of Canada

and World Wildlife Fund. This is a special conservation effort to protect 38 key natural areas in the southernmost part of Southwestern Ontario, most of which are in the private ownership of over 1,000 landowners. This "Carolinian zone", containing ecological communities and habitats unique to Canada, is under increasing pressure from intensification of the agricultural land base, and rapidly expanding recreational uses and urban and industrial development. The 38 sites represent a range of habitat types, including wetlands, in a variety of surrounding land uses.

By 1987, the research aspect of the NHSP lead to the development and implementation of the Natural Heritage Stewardship Award Program in the Carolinian region (in conjunction with the educational outreach program). This landowner recognition approach to promoting private stewardship requires owners cooperating in the program to make a verbal, strictly voluntary agreement to protect the natural areas on their land. They also consent to give notice of land use change, such as wetland drainage, when deciding to terminate the agreement. To recognize their ongoing contribution to protecting natural areas, owners receive a plaque or certificate of recognition. Recipients are recontacted at least annually to maintain and build upon the cooperation established when the agreement was first entered into.

2) Results -

As mentioned earlier in this section, it is very difficult to apply the evaluative criteria to the educational outreach component of the NHSP. First, receptiveness to a landowner education mechanism does not necessarily mean that the owner will opt to retain wetlands. Participation rate as outlined in the evaluation criteria refers to landowners who have

agreed to the terms of the mechanism and thus protect wetlands on their land. Secondly, an educational program does not require a legal or nonlegal agreement from the landholder and as a result it is difficult to keep track of the number of owners who have opted to retain wetlands. These limitations on evaluation apply to the educational component of the NHSP. Following the provision of information in the NHSP, data is not available indicating the number of landowners choosing to retain wetlands.

Rate of participation - Between 1985 and 1986 the educational outreach component of the NHSP personally contacted 539 landowners over 38 sites in the Carolinian region. Eighty seven percent of those owners contacted were receptive to the educational program and showed a positive attitude toward the concept of private stewardship. They were generally pleased to learn of the value and significance of their land and were also interested in ways to enhance or maintain these natural areas.

When the Natural Heritage Stewardship Award Program began in 1987, many of the landowners contacted in 1985-86 were revisited to see if they were willing to enter into the verbal agreement. As of August 1990, approximately 1200 landowners have been approached and asked to enter into agreements. Of the 1200 contacted, a high percentage (approximately 80) were supportive of private stewardship with 470 or 39 percent entering into the verbal handshake agreement. These agreements account for approximately 46 percent of privately owned land in the 38 sites identified for protection in the Carolinian region. Data indicates that wetland owners do not as readily enter into agreements as non-wetland owners. Program coordinators speculate that this is due to the larger size of wetland areas versus other natural areas on individual properties. The data also indicates that those landowners not receptive to the educational outreach

program and to the concept of voluntary stewardship without compensation tend to be young farmers with high liabilities.

Because it is difficult to evaluate the educational outreach component, it is unknown how many of those contacted owners supporting private stewardship but not entering into agreements are actually conserving their natural areas. Program coordinators visiting owners indicate that there are many owners who are very conservation oriented and have every intention of conserving their natural areas, but do not wish to enter into a stewardship agreement.

Length of participation and rate of compliance - As of October, 1990, the number of landowners opting out of the terms of their verbal agreements in order to pursue other land uses has not been an issue. As well, only a very few owners violated their agreements by changing land use without giving notice to the program coordinators. This low termination and violation rate must be tempered by the fact that the landowner recognition aspect of the NHSP has only been in place since 1987. Since the landowner agreements are strictly voluntary without any compensation, changing landowner economic status over a longer time period may cause many owners to opt out or violate agreements in order to realize returns from their investment in agricultural land.

Change in attitude - NHSP coordinators have not formally assessed the number of owners currently with agreements who have had a shift in attitude towards a stewardship ethic. However, inquiries by a number of landowners regarding other nonregulatory stewardship mechanisms which require greater owner commitment, such as conservation easements, has been interpreted as an attitudinal change towards conservation of natural areas.

3) Conclusion - The Chapter IV analysis indicated that both landowner education and landowner recognition mechanisms would probably have high owner appeal in the short term, decreasing to low appeal in the long term due to the lack of financial compensation. Given the limited time period the NHSP has been operational and the difficulty in evaluating education mechanisms, it is difficult to test the analysis and draw conclusions on the success of these mechanisms in promoting private stewardship.

As the landowner recognition component of the NHSP has only been operational since 1987, only a short-term evaluation of this mechanism is possible. As the program progresses, evaluating its long-term success in encouraging stewardship will be possible. The evaluation of short-term data indicates that only 39 percent of contacted landowners were willing to enter into a verbal handshake agreement- a level of owner appeal that is much lower that what was suggested in the analysis. Based on this 39 percent participation rate, it can be concluded that recognition agreements are only moderately successful in promoting private stewardship among a large number of landowners.

It was argued in the analysis that a large number of landowners who have opted to retain natural areas in the past will continue to do so in the short term under a recognition program because they have nothing to lose. The agreement can be easily broken when the owner wishes to change land uses. Reasons were not given for why many landowners who expressed an intention to conserve their natural areas refused to enter into a verbal agreement. The analysis identified inflexibility with regard to allowing compatible agricultural uses as a short and long-term disadvantage of recognition agreements. The insistence upon maintaining a wetland area in a natural state without other land uses may play a bigger role in the

initial acceptability of this mechanisms than was anticipated. Landowners may feel that some level of agricultural use such as grazing or haying is compatible with conservation of natural areas.

Although participation in recognition agreements is lower than anticipated over the short term, acceptability among those owners supporting the program is more consistent with the analysis. The evaluation shows that the recognition component of the NHSP has been well accepted by participating landowners. Since implementation, termination and violations of agreements have been negligible and program coordinators are seeing a shift in owner attitude towards a stewardship ethic. This owner commitment to the agreements indicates that this mechanism, over a short time period, has been successful in continuing to promote private stewardship of wetlands among participating landowners. However, based on the analysis, this success is expected to decrease over time as landowners move into land uses that allow a return on investment in agricultural land.

With regard to the education component of the NHSP, it is impossible to determine the short and long-term effectiveness of this mechanism in encouraging private stewardship of wetlands. Data from the NHSP shows that a very high percentage (87) of contacted landowners were receptive to the educational component and the conservation goal of the program. Because it is not known how many of these landowners actually opted to retain their natural areas, this result only gives a very general indication of the acceptability of an educational mechanism. If most of these landowners continued to conserve their natural areas in the short term, this level of acceptability would be consistent with the analysis. As well, it would indicate that this mechanism is successful in promoting private stewardship over a short time frame.

5.4 Summary

In this chapter, the six market and moral suasion nonregulatory mechanisms analyzed in Chapter IV were evaluated for their success in promoting private stewardship of wetlands. Evaluation criteria based on landowner participation were established to determine the landowner acceptability of the selected mechanisms as implemented in three Canadian stewardship programs: Alberta's Landowner Habitat Project, Saskatchewan's Prairie Pothole Project and Ontario's Natural Heritage Stewardship Program. Results from the application of the evaluation criteria were used to draw conclusions with regard to the success of the mechanisms in encouraging private landholders to retain wetlands, and the success of the mechanisms in continuing to promote stewardship among those owners participating in a stewardship program.

Data limitations imposed by the case studies did not allow for the evaluative criteria to be fully applied to all six mechanisms. A landowner survey, conducted by the Prairie Pothole Project to determine owner acceptability of a number of nonregulatory tools helped to supplement data gaps; however, conclusions with regard to the success of the six mechanisms in promoting private stewardship of wetlands are limited.

Application of the evaluative criteria is summarized in Table 2. Results with regard to the rate of landowner participation (coupled with supplemental data from the landowner survey) showed that owner acceptability and support vary among the selected mechanisms. Conclusions drawn from these results indicate that the mechanisms have varying degrees of success in encouraging private landholders to conserve wetlands. Figure 3 summarizes the mechanisms' success. Excluded are strong property tax incentives, landowner education and long-term landowner recognition

TABLE 2

A SUMMARY OF LANDOWNER ACCEPTABILITY OF SELECTED NONREGULATORY MECHANISMS AS DETERMINED BY PARTICIPATION IN STEWARDSHIP PROGRAMS

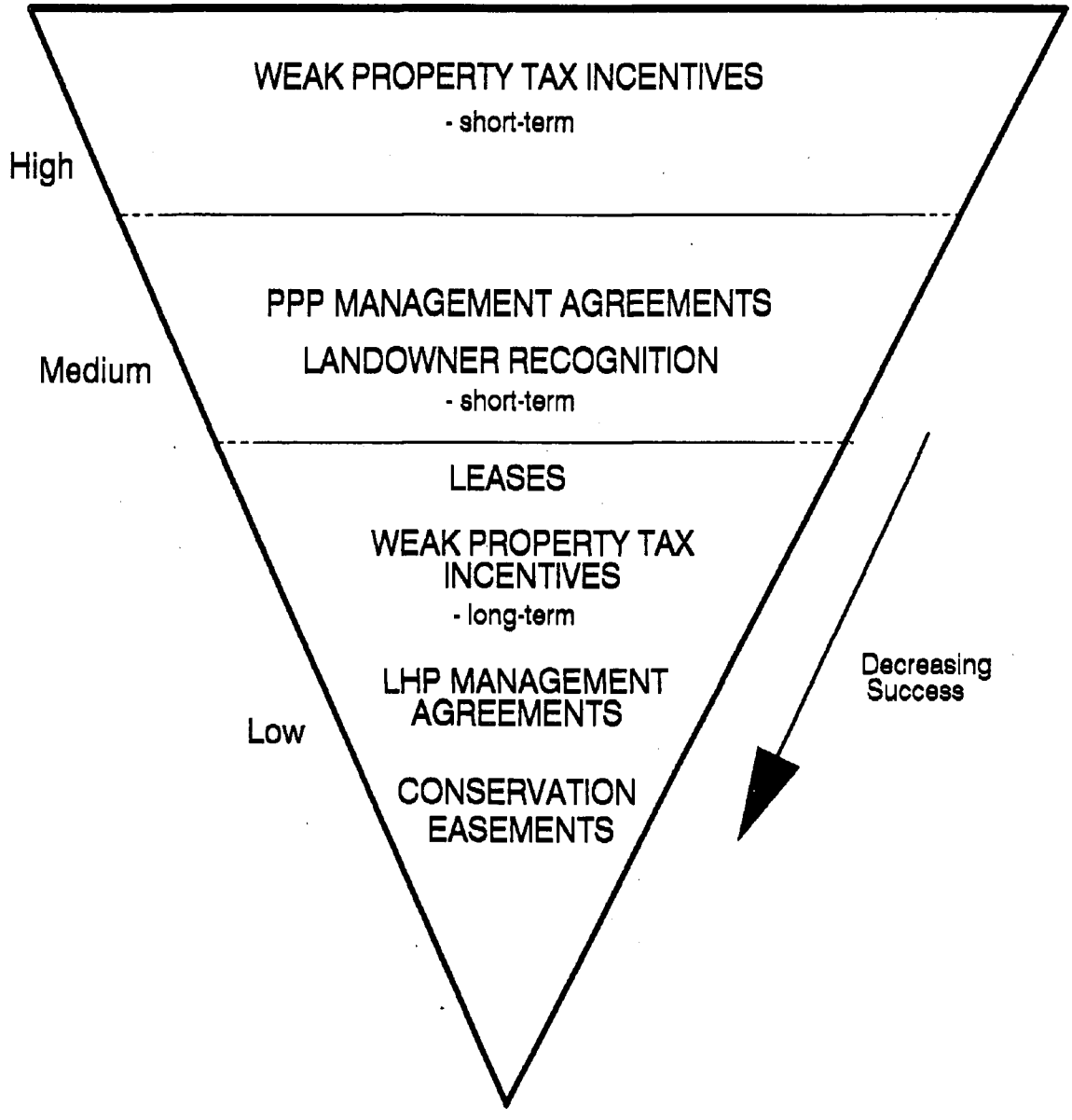
	EVALUATION CRITERIA				
		Length of Participation			
MECHANISMS	Participation Rate	Predominant Agreement Term Chosen	Termination Rate	Rate of Compliance	Positive Change in Attitude
Weak Property Tax Incentives** (short-term)	High (high)		Not Available	Not Available	Not Available
PPP Weak Property Tax Incentives* (long-term)	31% (low)		Not Available	Not Available	Not Available
LHP Management Agreements	30% (low)	20 year (high)	Negligible (high)	High (high)	Yes (high)
PPP Management Agreements	45% (moderate)	10 year (high)	Negligible (high)	High (high)	Not Available
PPP Leases	31% (low)				Not Available
PPP Conservation Easements*	9% (low)			Not Available	Not Available
NHSP Landowner Education	Not Available			Not Available	Not Available
NHSP Landowner Recognition (short-term)	39% (moderate)		Negligible (high)	High (high)	Yes (high)

Landowner Acceptability: (low) (moderate) (high)
*Based on PPP Landowner Survey
**Based on the Ontario Conservation Land Tax Reduction Program

Strong Property Tax Incentives, Landowner Education and Landowner Recognition (long-term) are excluded due to data limitations
Not Applicable

Figure 3

Success of the Selected Nonregulatory Mechanisms In Promoting Stewardship of Wetlands Among Private Landowners



Due to data limitations, the success of Strong Property Tax Incentives Landowner Education and Landowner Recognition (long-term) in promoting private stewardship cannot be determined.

agreements whose effectiveness could not be determined due to data shortfalls.

Results with regard to the length of owner participation, rate of compliance and change in owner attitude indicated that management agreements and landowner recognition agreements have the support and commitment of participating landowners. Conclusions drawn from these results suggest that these two mechanisms are successful in continuing to promote stewardship of wetlands among participating owners. This success however, was qualified by the fact that management agreements and landowner recognition agreements in the case studies have only been in place for less than 5 years. This success may diminish over the years, particularly with recognition agreements which do no offer the owner compensation. With regard to leases, property tax incentives, landowner education and conservation easements, data limitations were such that the effectiveness of these mechanisms in promoting on-going stewardship among supportive landowners could not be determined.

The evaluation carried out in this Chapter tested the analysis of Chapter IV. Probable landowner acceptability of the selected nonregulatory mechanisms, as determined by an analytical framework applied to the literature, was shown to be consistent with the actual owner appeal of the mechanisms as implemented in the case studies or assessed by way of the landowner survey in the Prairie Pothole Project. Management agreements offered by the Landowner Habitat Project and short-term landowner recognition agreements are an exception. Based on rate of participation, these two tools have lower owner acceptability than was expected. Although landowner acceptability of the mechanisms is consistent between the analysis and evaluation, data limitations make it difficult to draw

conclusions as to the validity of the analytical framework developed in Chapter IV. In all three case studies, only limited information is available as to why landholders either accepted or rejected a stewardship mechanism offered to them. The information that is available indicates that owners are concerned with adequate compensation, control over land use decisions, and mechanism flexibility which confirms at least a portion of the analytical framework. The framework also suggested mechanism complexity and certainty were concerns to owners, but due to limited case study information, these concerns could neither be confirmed nor discredited in the evaluation. There were however, concerns cited by owners which the framework did not cover including mistrust of local government as an administration body for incentive payments and fragmentation of farmland by leasing agreements and the resultant agricultural production inefficiencies. These concerns are valid and suggest that the analytical framework could be expanded on. As current stewardship programs progress and new ones are implemented, more information on landowner concerns will be made available which will allow stewardship program coordinators to more readily meet the needs and wishes of landholders.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Loss and degradation of wetlands across the prairie pothole region of Canada is severe and accelerating as on-going intensification of farming and expansion of the agricultural land base continues to exert pressure on the remaining wetland resource. Through increased public awareness of the societal values provided by wetlands, society is increasingly indicating a desire to preserve wetland environments. Although government has reacted to environmental degradation on privately held lands through the use of mandatory controls which interfere with the use and management of an individual's property, landowners and the general public in Canada are more receptive to the use of nonregulatory tools than of police power regulation as a means of achieving private wetland conservation. This preference reflects society's desire to minimize infringement on the property rights of landowners. This desire, in turn, reflects the perceived advantages and disadvantages associated with regulation and nonregulation including distributional impacts. Interference with private property rights is perceived negatively by society: society benefits at the cost of the individual landowner. Wetland retention through either moral suasion or the payment of economic incentives is recognized as positive: neither society nor the individual landowner is left worse off.

General public and landowner perceptions regarding the distributional impacts associated with regulatory and nonregulatory mechanisms and the high degree of societal receptiveness towards the use of nonregulatory tools to achieve wetland conservation objectives provided the framework in

which nonregulatory approaches to encouraging private landowner stewardship of wetlands were evaluated.

This chapter begins by summarizing the conclusions of Chapters IV and V with regard to the probable landowner acceptability of the six selected market and moral suasion nonregulatory mechanisms and their success in promoting private stewardship of wetlands based on actual owner appeal. General conclusions that follow from these specific results are then outlined as well as recommendations on how the nonregulatory mechanisms and stewardship programs can be improved upon in order to effectively encourage landowner participation. Further, recommendations are given for establishing a data base to monitor the success of nonregulatory mechanisms in promoting private stewardship and suggestions are made for further research.

6.1 Summary of Conclusions

Market approach

1) Property Tax Incentives

The literature analysis showed that strong property tax incentives would likely have moderate owner appeal; however, this level of acceptability could not be tested in the case studies due to data limitations.

The analysis also indicated that weak property tax incentives would likely have high owner acceptability in the short term, decreasing to low acceptability over time. The expected short-term appeal of this mechanism is supported by very case study results and as such, it was cautiously concluded that, over a short time period, weak property tax incentives are successful in encouraging private stewardship. The expected

diminishing long-term appeal was substantiated by case study data and it was concluded that, over time, the success of this mechanism in promoting stewardship among landowners is limited.

2) Management Agreements

From the literature analysis it was concluded that management agreements would probably have a moderate to high appeal among landholders. This result was both substantiated and contradicted by case study results. The actual owner appeal of management agreements offered in the Landowner Habitat Project (LHP) was lower than predicted and a conclusion was drawn that such agreements had limited success in promoting stewardship among landowners. The appeal of management agreements offered in the Prairie Pothole Project (PPP) was more consistent with expectations and it was concluded that such agreements are moderately successful in encouraging owners to conserve wetlands. The case studies also indicated that, since implementation, both LHP and PPP agreements have been successful in continuing to promote stewardship among participating landowners. This is a preliminary conclusion due to the programs having only been in place for a short time period and as a result, it is unknown if this mechanism will continue to receive participant support over time.

3) Leases

The literature analysis indicated that leases would likely have moderate appeal among landholders. This level of acceptability was supported by case study data and it was concluded that leases have limited success in promoting stewardship among landholders Conclusions regarding the success of this mechanism in continuing to promote stewardship among participating landowners could not be drawn due to the inflexible structure

of the lease agreements which make it difficult to determine participant support and commitment.

4) Conservation Easements

The literature analysis showed that conservation easements would likely have low landowner appeal. Case study data supported this expected level of acceptability and it was concluded that the success of this mechanism in encouraging owners to conserve wetlands is very limited. Conclusions regarding the success of this mechanism in continuing to promote stewardship among participating landowners could not be drawn due to data limitations.

Moral Suasion

5) Landowner Education

It was concluded from the literature analysis that landowner education mechanisms would probably have high landowner acceptability in the short term decreasing to low acceptability over time. This level of appeal could not be tested in the case studies due to data limitations.

6) Landowner Recognition

Conclusions drawn from the literature analysis with regard to the probable owner appeal of landowner recognition mechanisms are the same as those for landowner education. The expected high owner appeal of this mechanism over the short term was not supported by case study results. Actual owner appeal was much lower than predicted in the analysis and it was concluded that, over a short time period, landowner recognition is only moderately successful in encouraging stewardship among landholders. From this short-term data, it was also concluded that, since implementation,

this mechanism has been successful in continuing to promote stewardship of wetlands among participating owners. This is a preliminary conclusion based on the fact that the case studies have only been operational for less than five years and the analysis shows decreasing owner appeal of recognition mechanisms over time. The expected low level of acceptability of this mechanism over a longer time frame could not be tested in the case studies due to data limitations.

6.2 General Conclusions and Recommendations

From the results of this study, two general conclusions can be drawn. First, due to the infancy of stewardship programs in Canada and the resultant lack of short and long-term data on landowner participation, it will take time to demonstrate the effectiveness of nonregulatory mechanisms in promoting private landowner stewardship of wetlands. Currently, there are a limited number of stewardship programs in place across Canada and the three chosen for study in this thesis lead the way in terms of length of time in operation (approximately 4 years) and data generated. As current programs progress and new programs are initiated[1], a data base can and should be established whereby a better determination can be made of the short and long-term success of nonregulatory mechanisms in encouraging stewardship among landowners and in continuing to encourage stewardship among participating owners. Further on in this chapter, recommendations

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[1] In 1989-1990, Wildlife Habitat Canada assisted in the promotion of private landowner stewardship programs through the approval of over 1.3 million dollars to 10 new and ongoing private stewardship initiatives. This increases their commitment to over 6.3 million dollars allocated to 18 private stewardship programs underway in virtually every province of Canada (Wildlife Habitat Canada 1990).

are given concerning the development of a data base to monitor the success of nonregulatory mechanisms.

Second, from the different levels of success the mechanisms have shown in the case studies with respect to encouraging landowners to start practising stewardship, it is apparent that the mechanisms vary, over a broad range, in their ability to secure wetland acreage for protection[2]. (Information gaps exclude strong property tax incentives, landowner education and long-term landowner recognition agreements from this conclusion). Two general categories exist with regard to the adequacy of the mechanisms in protecting wetlands. First, those mechanisms which have only moderate to limited success in encouraging private stewardship are limited in their ability to secure wetland acreage for protection and thus only inconsistent conservation is achieved. The majority of the mechanisms, including management agreements, landowner recognition, leases, and conservation easements fall within this category. The second category includes those mechanisms which are successful in promoting stewardship over a short term only and thus are limited in their ability to adequately protect wetlands over a longer time frame. Weak property tax incentives fall within this category.

Given the two wetland protection categories attributed to the mechanisms, it would appear that not one of the mechanisms evaluated in this study ensures a high level of wetland conservation. The infancy of the stewardship programs may be a contributing factor. Although the

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[2] It must also be recognized that the effectiveness of nonregulatory mechanisms in continuing to protect wetlands over the long term is critical to the success of any stewardship program. However, sufficient evidence is not available at this time to indicate how successful each mechanism is with regard to maintaining support and commitment among landowners practising stewardship.

nonregulatory tools are currently limited in promoting private stewardship, any degree or of receptiveness and participation is valuable for building understanding and support for wetland preservation. Mechanisms such as landowner education which is well received by most landowners in the Natural Heritage Stewardship Program, and weak property tax incentives which show wide landowner appeal in the short term, can be very valuable in this role. Weak property tax incentives, for example, can be a starting point for promoting greater owner acceptability of other nonregulatory mechanisms which may provide for longer term wetland protection. By promoting the need for wetland conservation, they may increase owner receptiveness to management and lease agreements which ask for a land use commitment through legal agreements. As well, if they can shift landowner attitudes towards a stewardship ethic, some of the primary concerns of owners may eventually change and they may increasingly be more receptive towards restrictive nonregulatory mechanisms, such as conservation easements, which are less flexible and demand certain property rights. Increased participation in management and lease agreements should also have the same positive outcome with respect to increasing receptiveness to conservation easements.

To establish that the effectiveness of the nonregulatory mechanisms in promoting private stewardship can increase over time, stewardship programs in Canada must be given time to mature and build support among landowners for the conservation of wetlands. The political and financial backing for implementation of long-term stewardship programs and the maintenance of existing programs looks very positive. The contribution Wildlife Habitat Canada makes towards private stewardship is a good example as is the North American Waterfowl Management Plan (NAWMP). The NAWMP is a

comprehensive Canada- United States land use and wildlife habitat plan to restore waterfowl populations in North America. Established in 1988, programs are expected to cost 1 billion dollars over 15 years of which the majority is targeted for the prairie pothole region of Canada to finance a variety of private stewardship programs geared towards wetland preservation through nonregulatory, market mechanisms (Prairie Habitat Joint Venture 1990).

In addition to allowing stewardship programs to mature so as to possibly increase landowner acceptability, the mechanisms and programs themselves can be improved upon to make them more appealing to owners. From the evaluation of the case studies, it was established that adequate financial incentives, landowner control over land use decisions and flexibility are important in order to attract owner participation. Program coordinators must therefore strive to ensure that nonregulatory tools meet these three landowner concerns- the exception being landowner recognition mechanisms which do not provide economic incentives and conservation easements which are inflexible and limit owner control. In the case of management agreements under the Landowner Habitat Project, landowner appeal can be strengthened by having a flexible cancellation clause. Lease agreements under the Prairie Pothole Project can be improved upon by adding flexibility with regard to length of term and size of parcel to be leased. Currently, leasing of only 40 acre parcels contributes to farmland fragmentation and production inefficiencies. Finally, landowner recognition tools under the Natural Heritage Stewardship Program can be strengthened in terms of landowner appeal by adding more flexibility in the types of land uses permitted around a wetland. At present, wetland areas

are not allowed to support any agricultural production regardless of its compatibility with wetlands.

Currently, little evidence is available in the case studies to suggest if other landowner concerns and issues exist which affect mechanism acceptability. As more information on owner concerns becomes available, program coordinators need to assess and revise the nonregulatory tools to ensure they more readily meet the needs and desires of landholders.

With regard to improving the private stewardship programs, the evaluation of the case studies raise a number of questions that may have an impact on owner acceptability:

1) Rather than having the stewardship programs target a variety of agricultural lands in areas of wetland environments, would it not be more appealing if programs focussed, wherever possible, on land that is economically marginal for crop and livestock production? Lands with low agricultural value will likely have a higher probability of being committed to stewardship programs, especially if owners are not allowed any kind of agricultural land use. Regardless of the level of incentive offered to owners, they are in the business of growing food and are more apt to retain better quality lands for agricultural production.

2) Rather than having the stewardship programs target specific wetland retention activities which may encompass only a small portion of a landowner's farm, would it not be more appealing if programs are directed towards landscape stewardship? That is, maintaining and enhancing all aspects of the private land base including the soil resource, natural areas such as woodlots and wetlands and water resources such as lakes and streams.

> It should be remembered that most landowners don't compartmentalize their property. They see their property as a unit, recognizing the importance of the parts that make up the whole (Rzadki et al. 1988 p179-180).

At present, stewardship programs specific to either wetlands or soil conservation operate concurrently. A rural landscape approach would demonstrate to landowners that wildlife and agricultural objectives can be integrated, and would make owners more aware of the linkages between natural area protection and productivity of the soil resource. Only 6 percent of landowners participating in the Landowner Habitat Project were aware that protection of wetlands has soil conservation benefits such as limiting soil erosion through reduced spring runoff (Brusnyk et al. 1990).

3) Rather than stewardship programs offering only one or two nonregulatory options to landowners, would it not be more appealing if programs offered a number of different options ranging from landowner recognition to conservation easements? This would create a capacity for maximum flexibility in meeting the needs of a broad spectrum of landowners with diverse personalities and interests. Landowners could choose the option that best meets their needs and desires or opt for a variety of options for a number of different sites on their property.

6.3 Monitoring the Success of Nonregulatory Mechanisms

As current stewardship programs progress and new ones are initiated, it is necessary to establish an appropriate data base if the success of the mechanisms are to be monitored effectively. Determining the success of private stewardship programs will become increasingly important in the future as the public profile of the programs increases and society demands

to see the results that are achieved through their continued financial support.

Given the infancy of stewardship programs in Canada, data gaps or information limited to a short term nature is expected. However, stewardship program coordinators must focus on collecting key information in order to make a good determination of the mechanisms' success in promoting private stewardship. The evaluation of the case studies indicated that the data bases being developed are, for the most part, adequate to monitor success. Deficiencies that do exist are related to the social aspects of stewardship programs such as shift in landowner attitude and the benefits and disadvantages of a program as perceived by participants and nonparticipants.

Following are recommendations for establishing a data base that would allow program coordinators to effectively monitor the success of the mechanisms:

1) Landowners participating in the program as a percentage of the total eligible landowners (eligibility defined by quality of wetland on landowner parcel) must be determined.

2) Landowner commitment to a stewardship program must be established by determining the length of agreements entered into, number of agreements terminated prior to end of term, and agreement violations through land use changes.

Because most mechanisms require some sort of agreement, information is readily available on the number of participating owners, the length of agreements they entered into and agreement termination. Program coordinators will however, need to monitor over time the utilization of

cancellation clauses, number of owners renewing agreements and stewardship compliance in order to establish a long-term commitment by landowners. Compliance can be difficult to determine and may require on-going monitoring of owner land use patterns and resource management practices via a practical land stewardship monitoring system. The ability to readily monitor land use and management is particularly important for those mechanisms such as property tax incentives that can cover large areas and have large owner appeal in the short term. However, monitoring may also become increasingly important for other nonregulatory tools such as management agreements, leases and landowner recognition. Coordinators of the Landowner Habitat Project, the Prairie Pothole Project and the Natural Heritage Stewardship Program have expressed concern over the need to adequately monitor compliance. If these programs were to significantly expand over the next few years, some sort of formal land use and management monitoring program will be required to ensure incentives or recognition are only given to those landowners in compliance.

In addition to determining compliance, a monitoring system is necessary to establish landowner participation following an education campaign. Since no landowner agreement is required, only monitoring of land use will determine if education is at all effective in encouraging stewardship. Due to a lack of monitoring in the Natural Heritage Stewardship Program following an educational campaign, significant data limitations were faced in this study resulting in an inability to assess the success of this mechanism in promoting private stewardship.

3) Landowner attitudes towards stewardship of wetlands and the program in general is also an important component in determining the success of the mechanisms in encouraging wetland retention. A shift in

attitude towards a stewardship ethic must be determined as well as participant and non-participant perceptions with regard to the advantages and disadvantages of the stewardship program, specific features of the program that influenced or may influence participation, participant satisfaction, and the likelihood of future involvement by non-participants. To achieve these ends, those landowners involved in a stewardship program and those non-participants eligible to become involved must be personally surveyed. The survey of participating landowners should be an extension of the good line of communication maintained between the owner and program coordinator throughout the entire life of the program.

Establishing the ability of nonregulatory mechanisms to shift landowner attitudes towards a stewardship ethic is a particularly important component of the data base. It is critical that policies and tools for achieving those polices contribute to the building of a land ethic in society. Ultimately, if sustainable development is to be achieved, including a conscientious conservation of wetlands over time, landholders and society in general must have a land ethic based on the recognition that ecosystems and communities of life have intrinsic value.

6.4 Recommendations for Future Research

At many points throughout this study, limitations due to informational gaps have been acknowledged and unanswered questions have been raised. These present opportunities for further investigation into a number of areas related to the use of nonregulatory approaches to promote private stewardship of wetlands. First, the need for and content of a data base to establish the short and long-term success of nonregulatory mechanisms in encouraging landowners to conserve wetlands has been outlined

in this chapter and will not be dealt with further. Second, while an analytical framework for assessing the probable landowner acceptability of nonregulatory mechanisms was established and tested in this study, more research is needed to further refine it so that it could be of use when developing or revising stewardship programs. Limited information from the case studies supported three of the five landowner concerns making up the framework, including adequate compensation, landowner control and flexibility. Additional information regarding the primary concerns of landowners asked to participate in a stewardship program is required in order to better support these three concerns, substantiate the remaining two concerns from the framework (complexity and certainty), as well as to highlight other significant concerns. The proposed data base can play a significant role in supplying the needed information.

Finally, researchable questions primarily relating to the focus of private stewardship programs were brought up earlier in this chapter and warrant further investigation. First, there is a need to determine if stewardship programs have wider appeal among landowners if they target lands economically marginal for crop and livestock production. Concurrent with such an investigation would be the need to establish the quality and quantity of wetland environments that would be protected across the prairie pothole region if programs were to predominantly focus on marginal agricultural lands. Second, there is a need to determine if private stewardship programs have wider appeal among landowners if they deal with all conservation aspects of a land base through a comprehensive landscape approach. To test a landscape approach for landowner acceptability, there must be development and promotion of agricultural systems that not only benefit the agricultural land base but also natural ecosystems such as

wetlands. This will require a coordinated effort on the part of wildlife, environmental and agricultural agencies. Finally, there is a need to determine if programs have greater landowner appeal if they offer a number of nonregulatory options to owners such as the range evaluated in this study.

In conclusion, a nonregulatory approach to promoting private landowner stewardship provides society with an opportunity to meet natural area conservation objectives while encouraging the development of a sustainable land use ethic in the general public and individual landowners. This promise of the contribution nonregulatory tools can make towards building a land ethic in society is their greatest opportunity. For although both regulatory and nonregulatory mechanisms are viable approaches for meeting conservation objectives, nonregulatory tools may better serve the challenge of changing societal values and attitudes to reflect a responsibility towards natural ecosystems and communities of life.

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APPENDIX I

FEDERAL AND ALBERTA LEGISLATION WITH POTENTIAL IMPACTS ON WETLANDS IN ALBERTA

FEDERAL

Legislation	Potential Impacts
Migratory Birds Convention Act (Environment Canada)	**POSITIVE:** Provides the basic foundation for the North American Waterfowl Management Plan, an agreement between Canada and the United States with the objective of cooperation between the two countries in achieving waterfowl population goals. The importance of the plan in a wetlands habitat context is its emphasis on protection, restoration and management of wetland habitat for the maintenance of abundant waterfowl populations.
Canada Wildlife Act (Environment Canada)	**POSITIVE:** Empowers Minister of the Environment to coordinate joint federal/provincial wildlife policies and programs and to acquire lands for research, conservation and interpretation in respect of migratory birds or other wildlife. All provisions of the Act respecting wildlife extend to wildlife habitat.
Department of Agriculture Act (Agriculture Canada)	**NEGATIVE:** Provides for development and expansion of the agricultural industry through vehicles such as subsidies, grants, tax incentives, extension programs and research which are generally geared towards agricultural intensification through cultivation of wetlands and other lands not currently in production.

Legislation	Potential Impacts
Canadian Wheat Board Act (Canadian Wheat Board)	**NEGATIVE**: The Canadian Wheat Board was created to market Canadian-grown grain. The CWB sets grain delivery quotas currently based on total seeded and summerfallow acreage per producing farmer. This quota determination has been criticized for encouraging landowners to expand their quota acreage through cultivation of marginal land thereby promoting destruction of wetland basins and margins.
Income Tax Act (Revenue Canada)	**NEGATIVE**: Makes provision for federal income tax deductions for costs incurred in draining wetlands. A double monetary incentive for drainage can occur- a landowner can borrow money for drainage at subsidized rates such as through the Farm Credit Act and then recover the costs through tax deductions.
Prairie Farm Rehabilitation Act (Agriculture Canada)	**POSITIVE**: Created the Prairie Farm Rehabilitation Administration which administers soil and water conservation programs that could have a substantial impact on wetlands.
Canada Water Act (Environment Canada)	**POSITIVE**: Provides a framework for cooperative, coordinated approaches between federal and provincial governments for efficient conservation, development and utilization of any waters where there is a significant national interest.
Farm Credit Act; Agricultural and Rural Development Act; Agricultural Stabilization Act; Farm Improvement Loans Act; Excise Tax Act.	**NEGATIVE**: These Acts provide assistance to farmers, through low cost loans or tax credits, to expand and improve their productive land base often at the expense of existing wetlands.

PROVINCIAL

Legislation	Potential Impacts
Water Resources Act (Alberta Environment)	**POSITIVE AND NEGATIVE**: Provides for a licensing system for all diversion and use of water. There are two types of licenses pertaining to drainage: 1) a licence to impound water for water management, flood control, erosion control, flow regulation, conservation recreation, propagation of fish or wildlife, or like purpose and 2) a licence to use water in its natural state for conservation, recreation, propagation of fish or wildlife, or like purpose. The natural state licence has been used sparingly for wetland protection. The Act provides for enforcement of licensing requirements and has been used successfully in situations where wetlands have been illegally drained. Conversely, the Act provides for construction of works and undertakings, including drainage, by the province or jointly with local authorities, and a "notwithstanding" provision permits the Minister to approve drainage projects without formal licensing.
Drainage Districts Act (Alberta Environment)	**NEGATIVE**: Provides for the creation of drainage Boards which regulate drainage within the boundaries of their respective drainage districts. Although the last district was created in 1956 (there are currently 9 districts covering approximately 190,000 acres), their creation would likely accelerate wetland loss.

Legislation	Potential Impacts
The Department of the Environment Act (Alberta Environment)	**POSITIVE:** Contains provisions to establish "restricted development areas" or "water conservation areas" for a number of identified purposes, several of which include wetland conservation. However, they appear to have received little use in a wetland context. These provisions within the Act have considerable potential as powerful land use controls since the Act supersedes all other provincial legislation.
Irrigation Act (Alberta Agriculture)	**POSITIVE AND NEGATIVE:** Provides for the creation of irrigation districts and their governing boards which regulate drainage relating directly to the irrigation system. Activities of the boards may be both positive and negative with respect to wetlands- wetlands management projects have benefitted from water supplied by irrigation systems, conversely, rehabilitation of irrigation systems have detrimentally impacted adjoining wetlands. There are currently 13 Irrigation Districts covering over 1.48 million acres of irrigable farmland.

Legislation	Potential Impacts
Wilderness Areas, Ecological Reserves and Natural Areas Act (Recreation and Parks, Forestry, Lands and Wildlife)	**POSITIVE**: Provides for designation of "wilderness areas, ecological reserves and natural areas". Legislation is confined to individual areas under protection. The areas in question are usually small and thus, has little implication for protecting wetlands scattered widely across private land.
Public Lands Act (Forestry, Lands and Wildlife)	**POSITIVE**: The Act states that beds and shores of all "permanent" waterbodies are public land. Judicial interpretation of "permanent" meaning only those wetland areas remaining constantly wet in recorded history. The Act has been used to restrict agricultural development of wetlands. It permits departmental personnel to reserve and protect public land, including large acreages of public wetlands, from harmful developments or uses, and outlines prohibitions to any act or disturbance that may result in injury to bed and shores of river, streams, lakes or other body of water.
The Wildlife Act (Forestry, Lands and Wildlife)	**POSITIVE**: Explicitly forbids the sale of access to land for hunting purposes. Provides authority to establish wildlife and game bird sanctuaries of which eight currently exist as well as provides for the establishment of Habitat Development Areas.

Legislation	Potential Impacts
Department of Forestry Lands and Wildlife Act	**POSITIVE**: Empowers the Minister to place conditions on the use of Crown wetland areas at the time they are sold to private landowners. In addition, provides for "Ecological Corridor Agreements" for long term protection of important water courses on lands suitable for sale.
The Planning Act (Municipal Affairs)	**POSITIVE**: Allows a subdivision approving authority to require the owners of a proposed subdivision to provide part of the parcel of land as an "Environmental Reserve" if the parcel consists of a swamp, gully, ravine, coulee or natural drainage course. This is rarely applied in respect of wetland protection. Municipal land use bylaws may be used to a limited extent to achieve habitat management objectives.
Municipal Taxation Act (Municipal Affairs)	**POSITIVE AND NEGATIVE**: Wetlands are generally taxed at a very low rate and if drained, the assessment increases to reflect the increased productivity. Municipal taxes are often cited as incentive for wetland drainage. Because wetlands are not explicitly delineated on the assessment notice, landowners may think their wetlands are taxed as high as productive land and thus are motivated to put them into crop production for monetary return. Exempts for assessment all land occupied by Ducks Unlimited by lease or license.

Legislation	Potential Impacts
Soil Conservation Act (Alberta Agriculture)	**POSITIVE**: Provides a framework to promote sound soil conservation practices, to preserve Alberta's land base and to ensure agricultural sustainability.
Department of Agriculture Act (Alberta Agriculture)	**NEGATIVE**: Provides authority for the Minister to make loan guarantees to landowners for clearing, breaking, leveling, preparing, improving or developing land for any agricultural purpose. Drainage of wetlands could potentially fall under "improving" or "developing".
Agricultural Service Board Act (Alberta Agriculture)	**POSITIVE**: Directs Agricultural Service Boards to advise on the organizing of soil and water conservation programs in municipalities. The Board may recommend to a municipality measures to rectify situations of water erosion and land impoverishment.

Adapted from: Usher and Scarth (1989) and the Alberta Water Resources Commission (1989).