A Canadian Conservation Reserve Program: An Economic Perspective[1]

Terrence S. Veeman, Wiktor L. Adamowicz, and William E. Phillips[2]

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2 The authors are, respectively, Professor, Departments of Economics and Rural Economy, Associate Professor, Department of Rural Economy, and Professor and Chairman, Department of Rural Economy, The University of Alberta.

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Continuing concern over soil erosion and land degradation problems, especially in the prairie region of Western Canada, and the presence of a conservation reserve program in the United States have prompted Canadian officials to consider a similar program in Canada. Discussion to date has centered on a proposal for the conversion of marginal lands to a conservation reserve, a proposal which originated with the Prairie Farm Rehabilitation Administration (PFRA 1987) and which has evolved and become embodied, in part, in the nascent and proposed programs of the National Soil Conservation Program (NSCP).

The NSCP, first announced in December 1987 and under negotiation since April 1988, is envisaged as a three-year, $150 million dollar program to be cost-shared equally between the federal government and the provincial governments. A key item in the NSCP involves the potential conversion of marginal lands in the prairie region from annual cultivation to long-term vegetative cover. Approximately two-thirds of the NSCP funds are expected to be spent in the three prairie provinces of Saskatchewan, Alberta, and Manitoba. Of this allocation, somewhat over one-third--an amount of some $35 to $40 million dollars--appears to be slated to begin a conservation reserve program (House of Commons 1989).

In this paper, the role of a conservation reserve program in Canada is analyzed from an economic perspective. Initially, the nature and scope of land degradation problems in Western Canada are briefly examined and estimates of marginal lands in the prairie region are summarized and assessed. The main features of the proposed Canadian conservation reserve program are outlined and then compared and contrasted with American experience. The proposed Canadian reserve program is analyzed in three areas. First, the potential advantages of a conservation reserve are discussed. Second, the issues of acreage allocation and implementation are addressed. Issues in the acreage allocation system include the targeting of sensitive soils and the potential use of other criteria for the selection of lands into a reserve. Among the implementation issues are the effects of flexible entry and exit, the determination of incentive payments and the effects of increases in pasture and hay land on the livestock sector. Third, other conservation programs are compared with the concept of a national reserve. The forces which determine entrance into such reserves are examined in an attempt to predict the success of a national program.

The success of a Canadian conservation reserve program may hinge not on its reduction of the supply of grains but on the conservation aspects of the program. Several smaller scale reserves already exist in Canada, illustrating the conservation benefits of such programs. Much can be learned from these small scale projects as well as from the U.S. experience, and this information will aid in the construction of a Canadian conservation reserve.

1 The Land Base and Land Degradation in Western Canada

The prairie region of Western Canada contains about half of Canada's farms but over 83 percent of Canada's improved farmland (see Table 1). The total cultivated acreage in the three prairie provinces in recent years has averaged 86 million acres. Grain, chiefly wheat, and oilseed crops dominate prairie production.

Table 1

Farm Land Use, Prairie Provinces of Western Canada, 1986

	Alberta	Saskatchewan	Manitoba	Prairies
	- thousand acres -			
Total Farm Area	51,040	65,728	19,127	135,895
Improved Area	31,892	49,531	13,351	94,774
Crops	22,641	32,929	11,168	66,738
Fallow	5,256	13,982	1,258	20,496
Pasture	3,402	2,171	679	6,252
Other	592	449	246	1,287
Unimproved Area	19,149	16,198	5,775	41,122
"Marginal" Land Area[1]	18,100	27,400	5,200	50,700
"Marginal" Land Area as % of Improved	56.8	55.3	38.9	53.5

[1] PFRA estimates of area of high risk and problem soils, 1987--see Table 2.

Source: Veeman (1988) based on Statistics Canada, *1986 Census of Agriculture* and Prairie Farm Rehabilitation Administration, "Conservation Reserve for Marginal Land Conversion."

There are several features of land degradation which are commonly cited by agrologists. Some 30 to 50 percent of the original organic matter of prairie soils is estimated to have been depleted, thus leading to the loss of natural nitrogen-supplying capacity and a consequent deterioration in natural fertility. It is important to note, however, that while natural fertility has declined, actual fertility has not decreased because fertilizer use has generally increased and more than compensated for natural sources of nitrogen. Two critical soil components are typically cited: root zone depth and nutrient (primarily organic matter) content (Crosson and Stout 1983). Clearly, it has been and is possible for prairie farmers to substitute, to a very considerable extent, for the second critical soil component -- that of nutrient content.

The loss of the original organic matter content of prairie soils is alleged to have led to a deterioration in soil tilth or structure (an aspect which chemical application of fertilizers does not remedy) and to consequent greater susceptability to wind and water erosion. Productivity losses associated with some forms of wind and water erosion can be compensated for by improved farm management practices, including replacing lost nutrients with fertilizer; however, where soil depth becomes too shallow or very severe gullying occurs, the farmer's main option is control of erosion itself, not merely compensating for its adverse effects. Soil scientists have also been concerned with the increase in dryland soil salinity which affects roughly 5 percent of the prairie acreage (and affects some 2 percent of the prairie cultivated acreage to such a severe extent that yield losses of 50 percent or greater are estimated to occur). Finally, soil acidification is a further soil quality issue, particularly in the Peace River region of northwestern Alberta and northeastern British Columbia.

Many of these prairie land degradation problems, excluding acidification, are considered to be partly the result of the practice of summer fallowing. Summer fallowing is currently practised on some 25 percent of prairie cultivated acreage. The share of summer fallow in total cultivated acreage has rebounded somewhat in 1986, 1987, and 1988, though the general trend in the period between 1978 and 1985 involved a considerable decline in both absolute and relative summer fallow acreage on the prairies. In 1988, a drought year, Saskatchewan was estimated to have 33 percent of its total cultivated acreage in summer fallow with Alberta having nearly 20 percent and Manitoba only slightly over 9 percent. Summer fallowing is currently a rational producer response in the drier areas of the prairies given the farm producer's goals of net income enhancement, risk reduction, and spreading input use over the year. Nonetheless, there is a need to develop sustainable cropping systems and dryland moisture management regimes in which summer fallow plays a reduced role.

Most agricultural economists remain uneasy with estimates to date of the actual economic costs or losses associated with land degradation -- see, for example, Van Kooten and Furtan (1987). Moreover, they remain unconvinced that prairie or Canadian agriculture is going to suffer dire impacts in the next decade or two because of inadequate productive capacity associated with an inadequate land base or deteriorating soil quality. The calculated on-site costs of land degradation within agriculture in Canada have ranged from 750 million to 1.2 billion dollars with the "Soil at Risk" estimate of 1 billion dollars a commonly cited figure (Sparrow 1984). Typically, these estimated costs have rested on either the ingredient cost of lost nutrients or on the value of inferred yield losses where these yield losses were based on very fragmentary evidence. With respect to the first methodology, for example, the value of lost nutrients from sheet erosion could well be one billion dollars, but the actual economic or opportunity cost of these lost nutrients is zero if, in fact, topsoil depth is adequate to support plant growth with no reduction in yield. Suffice

it to say, we need a much better information base and much improved collaborative action between soil scientists and economists to estimate the on-site costs of soil degradation more accurately.

We should add, too, that there is very little work on the estimation of the off-site costs of land erosion in Canada. U.S. estimates of the off-site costs of erosion place these costs at 3.5 times on the on-site costs (Crosson and Stout 1983). Off-site costs of erosion are probably not so important in Canada. Agriculture Canada (1987) suggests that off-site costs of erosion in Canada are roughly double the on-site costs. Our own intuition in that off-site costs of soil erosion are more important in eastern Canada than in the prairie region.

2 Marginal Lands on the Prairies

In Table 2, PFRA estimates of the areas of soils which are of high risk (due to water or wind erosion and dryland salinity) and of the areas of soils which pose special management problems (because they are solonetzic, acidic, or wetlands) are presented. The total areal estimate of such "marginal" lands -- over 50 million acres -- is very large (likely excessively so) and represents over 50 percent of the prairie improved land acreage. Some 70 percent of these "marginal" lands -- nearly 35 million acres-- are prone to water or wind erosion, although one questions how adversely yields are actually affected on these lands in most years.

In examining maps of where this erosion-prone land is located in Alberta and Saskatchewan, we have been struck by the fact that it is not so heavily concentrated in the brown soil zone (the heart of Palliser's triangle) as one might have anticipated. In looking at the Alberta map in particular, the erosion-sensitive lands seem to be located in regions where wind velocity is a concern and not necessarily where lowest precipitation and organic matter occurs. The PFRA estimates for erosion-prone land appear to be based more on land at risk to wind erosion rather than at risk to water erosion. There is a need to integrate previous work by Alberta Agriculture on water erosion potential (Desjardins, McDonald-Date and Tajek 1986) with the PFRA estimates.

Indeed, we are concerned that policy-makers lack specific information of the precise location of where the most highly erodible soils occur on the prairies. We shall return to this concern and the associated issues of identification and targeting later in the paper. Despite this caveat, we believe the conservation reserve potential (at a 50 percent participation rate) of 7.2 million acres to be a realistic and useful guideline for policy purposes. This goal represents 8 percent of the prairie cultivated acreage. As indicated, some 3.6 million acres of this 7.2 million acre potential would be related to erosion prone land and would be candidates for conversion from marginal cultivation to long term vegetative cover.

Table 2

Estimated Area of High Risk and Problem Soils Currently Under Cultivation and Estimated Conservation Reserve Land Potential, Prairie Region, Western Canada, 1987

	Alberta	Saskatchewan	Manitoba	Prairies	Assumed Conversion Ratio	Potential Conservation Reserve
	- million acres -				percent	million acres
High Risk Soils						
Severe Wind and Water Erosion						
CLI 1-3	5.2	14.9	2.6	22.7	5%	1.1
CLI 4-6	4.1	6.2	1.9	12.2	50%	6.1
Dryland Salinity (≥50% yield loss)	0.5	1.0	0.3	1.8	80%	1.4
Problem Soils						
Solonetzic	2.8	2.9	0	5.7	30%	1.7
Acidic (pH ≤6)	4.7	0.6	0	5.3	50%	2.6
Wetlands	0.8	1.8	0.4	3.0	50%	1.5
Total	18.1	27.4	5.2	50.7	--	14.4
At 50 percent participation rate						7.2

Source: Veeman (1988) based on Prairie Farm Rehabilitation Administration, "Conservation Reserve for Marginal Land Conversion," Tables 2 and 3.

3 The Canadian Conservation Reserve Proposal

Current Canadian initiatives for a conservation reserve have arisen out of a proposal originally put forward by the Prairie Farm Rehabilitation Administration in mid-1987 (PFRA 1987). The PFRA discussion paper noted that there were several ways a conservation reserve might be established. In general terms, the goals of the PFRA proposal, the criteria for eligibility, and the eligible uses of a conservation reserve were reasonably similar to the American Conservation Reserve Program (CRP). PFRA certainly stressed that any marginal land retirement plan would have to be integrated with other federal/provincial initiatives in land use planning -- in particular, the North American

Waterfowl Plan. PFRA suggested that financial assistance to producers might be $35 per acre: $10 per acre to cover foregone net income during the first year and $25 per acre to assist with establishment costs. PFRA did not envisage a continuing annual payment for farm producers (as in the United States), but farmers would be permitted to use the grassed land for pasture or hay (unlike the American CRP). The PFRA proposal, then, involved much less financial incentive for Canadian farmers to enrol than their American counterparts who could receive approximately $40 U.S. to assist in the establishment of permanent grass cover and an annual payment, via the bidding process, which averaged $50 U.S. in 1987 enrollments. The PFRA proposal also suggested that reserve land could likely remain eligible for quota acreage under the grain delivery system and left open the issue of whether retired land would be eligible for income support programs such as the Special Canadian Grains Program. PFRA estimated that the program costs of such a Canadian conservation reserve would be in the order to $250 to $300 million.

In initial discussion in prairie circles after the release of the PFRA proposal, the following points of view or concensus emerged (Hill, 1988): (1) the conservation reserve program should be only one element in a broader soil conservation program; (2) other prairie farm policies or programs (specifically, crop insurance, quota policy, and subsidy programs) should be conservation-neutral; (3) even more stress should be placed on the non-agricultural uses of retired land -- for example, duck habitat; (4) marginal lands should be taken out of production permanently, not just for a ten-year period; (5) more attention should be placed on targeting the very worst lands in any conversion program; and (6) prairie farmers and farm leaders were not very favorably disposed to the cross-compliance tools prevalent in the U.S. legislation.

A smaller scale, fledgling Canadian conservation reserve program is now emerging under the umbrella of the National Soil Conservation Program and as joint federal-provincial agreements are being signed. In recent testimony to the House of Commons Standing Committee on Agriculture (1989), Dr. Harry Hill, Executive Director-General of the NSCP, foresaw three possible options for farmers within the CRP-related component of the NSCP. One aspect would be the possible payment of $20 per acre to sow down erosion-susceptible land to grass cover. A second possibility would be the signing of a longer term (20 or 21 year) contract for those farmers who submitted a successful bid and wished to place their marginal land under permanent cover. Dr. Hill speculated that bids, to be paid out as a lump sum, might be some $40 to $60 per acre. The most highly erodible lands would be targeted first with program administrators accepting the most attractive (least cost) bids. Excessive bids would be rejected, Dr. Hill felt, if they exceeded some multiple of the assessed value of the land. Farmers would be permitted to use conservation reserve lands for pasture or hay. The third dimension of the program would involve financial assistance to wildlife organizations who wished to purchase marginal land for habitat purposes.

The fore-going reserve program will be a useful start. But it will be relatively modest in scale and may not prove that attractive to farmers given such financial incentives. If one assumes that some 36 million dollars are available over three years for the implementation of the reserve program and that $80 per acre is paid to farmers ($20 per acre to assist with grass planting plus $60 per acre for the lump sum payment), some 450,000 acres of PFRA's estimated 3.6 million acre potential could be retired during the initial three-year period of the NSCP. It should be pointed out, too, that the $60 per acre lump sum figure represents the capitalized value of the stream of annual payments of $4.81 per acre per year over 20 years at 5 percent. Such values are not likely to be very attractive to farmers even if their land is rather marginal (with low and unstable yields) and they could use the retired land for pasture. If PFRA community pasture experience on the prairies' "original conservation reserve" (2.2 million acres of marginal land largely retired as an outgrowth of the Dirty Thirties) is any guide, pasture values involve a gross return of approximately $53 per cow/calf unit per five month season or $5.50 per acre per year, assuming a carrying capacity of 9.6 acres per cow on such marginal land. Net pasture values, of course, would be even lower and possibly negative in terms of private returns and costs.

In short, there are concerns whether the Canadian reserve program, as currently envisaged, involves sufficient financial "carrots" to entice farmers to enrol marginal, erosion-prone land. Nor are financial "sticks" built in to the Canadian proposal, in part, perhaps, because the potential scope for cross compliance measures (especially if the Special Canadian Grains Program is discontinued) is more limited than in the United States.

4 Rationales for Conservation Reserves

The need for land resource conservation through a reserve program arises in part because benefits to society as a whole can be forthcoming. These take place in the form of reduced on-site erosion costs, decreased off-site erosion losses and enhanced wildlife and amenity values associated with improved habitat regimes. The need for public involvement in such a program arises because of the lack of private landowner incentive to alter land use patterns. Only part of the conservation benefits (largely in the form of reduced erosion costs) accrue to the landowner and may be insufficient to encourage adoption of conservation practices.

The remaining benefits accrue to society as a whole. No market mechanisms exist to allow landowners to capture these benefits. Reduced off-site erosion losses that lead to such improvements as reduced siltation and improved water quality represent a form of extra-market benefits that are difficult to measure. Improved wildlife habitat and other natural amenities increase benefits to society through outdoor recreational and related societal activities as well as non-use benefits associated with natural ecosystem conservation.

Farmers generally recognize the importance of reduced on-site and off-site erosion losses as well as the importance of retained or enhanced natural ecosystems. However, private economic goals to enhance income are generally of paramount importance (Phillips and Veeman 1987). This desire coupled with government policies and programs to increase production may leave little or no incentive for conservation measures. There are exceptions of course. One popular conception is the notion that erosion loss reduction through the adoption of minimum till or zero till practices in parts of the prairies is complementary with private economic goals. Much of the empirical evidence to date, however, suggests that the reverse generally holds (Zentner and Lindwall 1982), although changes in technology and decreased chemical prices may alter this relationship in the future. There are also cases in the prairies when waterfowl habitat retention and improvement is complementary with increased hay production through the installation and use of control structures or agricultural drainage installations. More often, however, resource conservation practices that are largely of benefit to society as a whole compete with private producer goals. Consequently, public involvement through such means as a government reserve program may be in society's best interest.

The social evaluation and implementation of soil conservation programs such as a conservation reserve therefore pose particular difficulties. The overall social benefits of a resource program include a mix of both private and external (to producers) benefits. Clearly, there are externality problems present and aspects of market failure which require some degree of government intervention. Public policy-makers are faced not only with the choice of an appropriate mix of private and public responsibility, but also with the choice of appropriate instruments (direct regulation, incentive systems, and so on).

Determination of an appropriate shift in private land use patterns through public policy prescriptions must be made. This task is difficult due to market failure, limited public budgets and lack of individual incentives. The extent of enhancing benefits to society as a whole over time requires some quantitative knowledge of benefits when possible and qualitative judgements of magnitudes otherwise. Even if desirable goals or targets can be set, public funds may not be available in sufficient amounts to fully achieve these targets. Moral suasion will not be enough to convince private land owners to alter land use patterns and practices.

One of the prime goals of the Unites States Conservation Reserve Program is reduction of agricultural commodity output through complete removal of land from any form of agricultural production. The rationale for a Canadian program need not emphasize such a goal. The conversion of marginal lands into a reserve is not an effective method of supply control. The retirement of 7.2 million acres would only remove 2 to 3 million tonnes of grain from prairie production (Veeman 1988). Therefore, in this paper we exclude supply control considerations as part of program rationale. However, there are implications that must be recognized. First, lands removed from cultivation may lead to

intensification and increased erosion on remaining cultivated lands. Hence, the reserve program benefits may be offset in part. Second, conversion of cultivated lands to forage production and pasture may lead to reduced prices for these goods and services. The extent of such a possibility and the impact on the livestock industry has not been empirically determined to date however. While there may be no compelling reasons to include grain supply control measures in a Canadian reserve program, there is a need to address these implications.

The main purposes for a Canadian conservation reserve program are to increase benefits for reduced on-site and off-site erosion losses and enhanced wildlife habitat. Considerable emphasis has been given to on-site reductions in program implementation in the U.S. and current discussions in Canada likewise appear to primarily emphasize on-site reductions. A balance on all three forms of benefits (on-site loss reductions, off-site loss reductions and enhanced wildlife habitat) must be included in a Canadian program.

5 Issues in Design and Implementation

The design and implementation of a conservation reserve program cannot take place in isolation. There is an array of existing programs that change over time. Some would be complementary to the reserve program such as land owner habitat programs. Many would be competitive such as support programs linked to production acreages.

The design or implementation of a conservation reserve program must be flexible. Severity of erosion and habitat losses vary considerably from region to region and among areas within a region. Land productivity, production practices and commodity mixes vary widely as well. Implementation of any program must recognize this in order to achieve policy goals in a cost efficient manner.

Each area must be assessed as to the relative severity of erosion damage (including both agricultural and non-agricultural effects) and locations must be identified and ranked by degree of need for removal from cultivation. Each area must also be assessed in terms of wildlife habitat contributions to support big game, upland game, waterfowl and fisheries. An assessment of the manner and extent to which existing programs already meet desired goals must also be made. In short a conservation reserve program must be highly decentralized to be most effective.

There are a number of program implementation issues that need attention if such a conservation reserve program is to go ahead. The scope of this paper does not permit detailed discussion of each item. They are, however, identified here.

Because support programs (both direct such as payments and indirect such as fuel rebates) may counteract the adoption of conservation measures and because retained cultivated lands could be more intensively used, the relationship between farm programs and both reserve and retained land must be examined. Programs such as the Canadian Wheat Board delivery quota mechanism and the recent special grains program are tied to

farmers' total cultivated acreages. The ability to maintain participation in these programs even when acres are enrolled in the reserve will increase the attractiveness of the reserve program to farmers, although continuing eligibility of reserve acres with respect to farm programs will need to be assessed on a case by case basis.

Compensation to farmers for lands taken from cultivation must be established on a farm by farm basis as farmer sacrifices will vary as will the degree of conservation benefits among potential farmer participants. Considerable emphasis has been given to the use of a bidding process (House of Commons 1989) not unlike the process used in the U.S. program. The concept has strong theoretical appeal but in practice may be less than satisfactory, particularly when a bid cap component is introduced. Alternative consideration should perhaps be given to an offer/counter-offer process with each land owner on a decentralized basis using market indicators such as rental lease rates as indicators of compensation levels.

Earlier in this paper some indication of the order of magnitude of funding for a Canadian reserve program was given. Allocation of funds among federal, provincial and local entities will be a major task. Jurisdictional issues will need clarification and integration to facilitate program implementation and operation. Because decentralization is viewed as an important component, some degree of local autonomy must be sanctioned by the other two levels of government.

To the extent that lands are withdrawn from cultivation in the various counties and districts, local tax charges could be an issue. Property taxes on withdrawn lands, if lowered, could lead to a rise in general rates to compensate for the initial reduction in tax revenues. Recognition of this issue must be made, particularly in areas where a relatively high portion of cultivated lands are put into reserve.

Since other forms of agricultural land use, particularly pasture and forage production, are permitted, then implications for the livestock industry already discussed above must be recognized. Land values may be affected in this and other ways. Capitalization of program benefits into land value is possible and could be an issue needing attention in the implementation process.

Legal aspects of a reserve program need to be carefully set out. In some instances withdrawn cultivated lands may be ensured by a caveat or a change in title indicating government lease may be appropriate. Termination dates will no doubt be an important feature for many potential participants.

Irrigated lands are a special case because of their exceptionally high productivity. Soil conservation and/or fish and wildlife benefits will need to be particularly high in order to economically justify withdrawal in a reserve program. Incentive payments will likely have to be higher to encourage enrollment of such lands.

Much of the success of a conservation reserve program may rely on its ability to target conservation efforts in critical resource areas. There are a number of targets that must be built into a program. In terms of achieving desirable application acceptance rates among areas, targeting improved information and education programs is essential. Increased awareness of benefits of reduced erosion and increased natural areas will increase attractiveness of program (Nielson 1986). The program, its goals, its terms and its contribution to applicants and society as a whole must be publicized and promoted.

In order to target locations in different areas for conservation measures, criteria must be established such that program funding will be directed to those areas in which conservation efforts will have the greatest impact on society. Desirable rates of reduced erosion commensurate with desired levels of reduced on-site and off-site damages must be determined within budget limits. The program may also include desirable rates of on-farm planning and advising to complement targeting of cultivated lands for withdrawal.

6 Existing Programs for Land Conservation

Several programs which are designed to remove land from production or potential production, beside the CRP, already exist in the U.S. and Canada. These programs include a variety of soil erosion control programs and a number of wildlife habitat preservation programs. These programs provide a method of examining the efficacy of the incentive and agreement structures in light of the proposed Canadian plan. One such program is Alberta's Landowner Habitat Program (LHP). The LHP pays landowners to keep land out of production or remove land from production if that land is classified as wildlife habitat. The program is voluntary and is very flexible. The land is removed from production or agricultural use (some exceptions have been made which allow for limited agricultural use) for anywhere from 5 to 50 years and the number of acres contributed and the rate of compensation is open to negotiation between the landowner and the agency. Local rental rates are used to determine the basis of the negotiation process and factors such as the quality of the habitat are considered in the determination of compensation. Additional incentives include signage and other forms of recognition for the landowners. This program is aimed at lower quality agricultural land which is suitable for wildlife habitat. In many ways the LHP is similar to the Canadian proposed reserve. Both are voluntary and involve the removal of lower quality land. Both expect to remove land from production or keep it out of production for around 20 years. The purposes of the schemes are somewhat different (soil erosion versus wildlife habitat) but an examination of the incentive program of the LHP may provide some lessons for the Canadian proposal.

Table 3 outlines the participation and compensation levels in the LHP as of January 1989. Over 18,000 acres have been enrolled in the program through 123 agreements. The majority of the agreements are for 20 years (slightly longer than the time horizon of the CRP program and about the length of the suggested Canadian program). The average size

of a parcel enrolled is approximately 150 acres per agreement. The compensation paid varies considerably across the agreements and is based on a schedule of rates which differ by region and land type. The quality of the wildlife habitat also affects the compensation payment. The compensation per acre per year varies between $2.77 and $9.42 for most parcels of land with the average compensation being $6.39. When the range of annuity values are discounted (at 5%) to determine the present value of the annual payments over the agreement length the value ranges from $11.99 for a five year agreement to $117.12 for a 25 year agreement. Evaluating the annual payments over a 20 year horizon at 5% the present values range from $34.50 to $117.39. The present value of the average annual payment of $6.39 per year is $79.63. These figures are slightly higher than the suggested compensation amounts for the Canadian proposal. Also, these lands are often not part of the cultivated acreage of the farm and thus their value may be somewhat lower than the acres targeted by the proposed Canadian reserve.

Table 3

Summary Statistics for the Landowner Habitat Program

Term (Years)	5	10	15	20	35	50	Total
# of Agreements	19	36	4	60	3	1	123
Area (Acres)	3218	3764	173	10999	183	86	18423
Avg. Acres Per Agreement	169	104	43	183	61	86	150
Cost $/Acre/Year	2.77	4.57	9.42	4.16	8.31	****	6.39
Discounted Present Value over term (at 5%)	11.99	35.29	97.78	51.84	117.12	****	79.63

**** This single agreement is a land purchase lease back arrangement.

A recent survey of 88 of the participants in the LHP completed by D. Westworth and Associates (Brusnyk *et al.* 1989) provides some other insights into the workings of a voluntary land reserve program. When asked what the advantages of such a reserve are, 44% of the respondents indicated that the program benefits wildlife, 14% indicated that water and soil conservation benefits resulted, 13% cited chances to view wildlife as the advantage and only 11% listed financial compensation as the advantage of the program. When asked about disadvantages, 62% responded that there were no disadvantages, 10% indicated agreement difficulties (especially in the case of land sales and transfers), 7%

indicated increased problems with hunters and 2% stated that the financial compensation was insufficient. When asked if they were pleased with the financial arrangements, 22% responded that they were "very pleased", 68% were "pleased" and 9% were "not pleased". As mentioned above, the agreements are based on negotiation between the landowner and the agency. When asked the reason for selecting the particular agreement type, the majority of landowners cited compatibility with their farming operations or the flexibility of the arrangements. Less than 10% cited financial compensation as the primary motivator in selecting agreements. These participants in the LHP were also asked if they would have retained the wildlife habitat without the LHP program. Nearly 80% of the respondents said that they would have maintained the habitat without the program.

In order to compare the responses of these participants with similar landowners in the same regions interviews were also completed with a group (82) of landowners not in the program. When asked to rate various features for their importance in influencing participation in such a program, LHP participants rated interest in habitat and wildlife more highly than nonparticipants while nonparticipants gave financial incentives a higher rating than current participants did.

Several lessons can be learned from the LHP program. First, there seems to be support for a decentralized, flexible system that can accommodate individual operator needs. The negotiation system used in the LHP results in a high level of satisfaction with the program. The flexibility and compatibility (with farming operations) of the program were cited as significant advantages. Second, the payment resulting from these negotiations suggests that the levels of support cited in the Canadian reserve program may be too low. The lands retired under the LHP plan are likely of lower value than the acres the Canadian plan expects to remove yet the present value of the LHP payments exceed the Canadian amounts in some cases. There is some evidence that financial incentives may not be as important as some expect. Many LHP members downplayed the importance of the compensation and viewed it as a token payment or a payment to defray taxes. Other forms of recognition for entering such a program also appear to carry considerable weight. However, this may be due to the type of lands removed (not primarily cultivated lands) and this phenomenon may not exist in the Canadian reserve program.

Factors such as the form of agreements and the role of incentive payments must be investigated as they will contribute to the success of the conservation reserve plan and its financial viability. Evidence from the LHP suggests that flexibility in agreement type and decentralized administration will contribute to the success of the program. The current Canadian proposal has some elements of flexibility in the determination of compensation payments (a bidding scheme has been proposed). However, it appears that flexibility in the length of contract may be an important factor as well.

A program similar to the LHP is currently operating in Saskatchewan. The "Prairie Pothole Project" currently holds some 13,500 acres under licensed rental agreements which permit haying and grazing but prevent drainage and cultivation. These licences are mostly 10 year agreements with an average compensation of $4.20/acre/year. Over 600 acres of cultivated lands have also been removed from production under this program with an annual rate of compensation of $30.00/acre/year. A socioeconomic analysis of this program revealed that non-economic factors (concern for wildlife habitat, etc.) are important elements of the decision to enroll non-cultivated acres in the program but economic incentives are the most important elements in the decision to enroll cultivated acres (Russell and Eskowich, 1989).

This Saskatchewan study also surveyed landowners to elicit the amount they would have to be paid in order to remove acres from cultivation. The mean bid of $61.80/acre/year is considerably higher than the current payment of $30.00/acre/year and the estimated rental value of $19.76/acre/year (Russell and Eskowich, 1989). These results reinforce the concern that the Canadian program may be underestimating the payment required to remove land from cultivation.

7 Conclusion

Land degradation is a continuing policy challenge in the prairie region of Western Canada. One part of the policy package to combat land degradation involves the conversion of marginally productive and erosion-prone cultivated land to long term, vegetative cover. Some 3.6 million acres of marginal land susceptible to wind and water erosion have been broadly identified on the Canadian prairies as being prime candidates for inclusion in a Canadian conservation reserve program.

In this paper, we have discussed several economic aspects of the proposed Canadian CRP, a plan which is emerging as a key focus, but not the sole component, of the National Soil Conservation Program in Canada. Several economic concerns have been identified: the lack of precise knowledge of lands to be targeted; insufficient attention to economic criteria (and in particular, off-site damage reduction and habitat enhancement) in the eventual choice of targeted lands; the apparent insufficient financial incentives to entice farmers into the Canadian plan; the relatively modest scale of the Canadian CRP; and the need to provide flexibility and decentralization, within broad federal and provincial guidelines, in the implementation of the program.

A conservation reserve program for marginal cultivated land, prone to erosion, on the prairies has considerable intuitive appeal. Not only would fragile land be converted to a use pattern more suited to its longer-run capability but there are also suspected to be important conservation-related benefits of such a program. The design of a Canadian CRP is not without its difficulties and challenges. Our hope is that a Canadian conservation reserve program can be put in place that is relatively efficient and effective.

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