FACTORS AFFECTING SUITABILITY
OF
ON-FARM REMEDIAL MEASURES
FOR
NON-POINT POLLUTION CONTROL
IN THE CANADIAN GREAT LAKES BASIN

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UPPER THAMES RIVER CONSERVATION AUTHORITY

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MARCH, 1982

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ABSTRACT

This report presents the findings of a one year research project dealing with the effectiveness and farmer acceptability of specific soil conservation practices within the Thames River Basin.

Eighty-two farmers with one or more soil conservation practices in place on their farms were interviewed. The farmers were asked to rationalize their attempts at conserving soil in terms of the benefits, costs and effectiveness of their conservation practice(s). The specific benefits can be considered "selling points" for extension personnel involved in promoting remedial measures. The costs (both direct and indirect) of implementing a soil conservation practice can be viewed as "barriers to acceptance". These obstacles must be removed, resolved or discredited if the practice is to become highly acceptable to the farming community. However, these costs and benefits are criteria which should be considered when making site specific recommendations.

In addition to the above, several farmers with erosion problems were interviewed. The purpose was to determine the factors farmers considered in their decisions to implement remedial measures.

An opinion survey dealing with the acceptability and effectiveness of a wide variety of conservation practices was developed and mailed out to five-hundred and twenty-three farmers within the Thames River Basin. This survey generated data on farmers' attitudes towards soil erosion as it relates to water quality, farm productivity, farm priorities and existing government programs.

Several professionals (i.e. Agricultural Engineers, Soils and Crops Specialists, Drainage Commissioners, etc.) associated with soil conservation were interviewed or contacted by mail to determine their attitudes towards erosion control and their approach to remedial measures.

Extension personnel can use this document when making site specific recommendations. Researchers can use it to determine research hypotheses and priorities.

1.0 BACKGROUND

In 1980, the International Joint Commission published a report entitled "Pollution in the Great Lakes Basin from Land Use Activities". This study identified agriculture as being a significant contributor of phosphorous and sediment to the Great Lakes. Soil erosion is a natural process. However, changes in the agricultural industry have accelerated soil losses in some areas to depleting levels.Some of these changes are as follows:

1. The agricultural economy has evolved into an era of crop specialization with an emphasis on row crops.

2. Improved production inputs (i.e. seed, fertilizer, etc.) are masking the effects of soil erosion and allowing farmers to engage in continuous monoculture.

3. The growing size of farm implements is resulting in larger fields, longer slopes, fewer fencerows and woodlots.

4. Farming has evolved from a way of life to a business. Many farmers view themselves as profit maximizers first and stewards of the land second.

In recent years, there has been a substantial amount of research into the causes and effects of soil erosion. However, there has been little research into the suitability and farmer acceptability of soil conservation practices. It is important that researchers and extension workers involved in soil conservation and water quality protection know how the various remedial measures are viewed by farmers in terms of costs, benefits and effectiveness. This type of data is necessary to the development and successful implementation of water quality and soil conservation related programs.

In March 1981, Agriculture Canada in conjunction with the Ontario Ministry of Agriculture and Food, initiated a one year soil conservation research project. This project evaluated the acceptability and effectiveness of conservation practices in terms of reduced erosion and improved water quality. This task was accomplished through four approaches:

1. Over eighty farmers with conservation practices in place on their farms were personally interviewed. The results provide insight into how farmers perceive a wide variety of remedial measures. Benefits, costs and site characteristics were noted during each interview where possible.

   Information has been gathered from individuals with first hand experience in the area of soil conservation.

2. Several farmers with various soil erosion problems were personally interviewed. These farmers identified factors that influence their decisions to spend time and capital on soil erosion control.

3. An opinion survey was developed and mailed out to over five-hundred farmers located throughout the Thames River Basin. The purpose was to gather information from average farmers on the effectiveness and acceptability of a wide variety of conservation practices.

4. Professionals (i.e. Agricultural Engineers, Soils and Crops Specialists, etc.) were contacted to determine their attitudes towards water quality degradation from agricultural soil erosion and their approach to remedial measures.

2.0 STUDY GOAL

Study Goal: To determine the on-farm factors affecting the direct and indirect costs and inconvenience to farmers of a number of on-farm remedial measures, and relate these factors to the effectiveness of the remedial measures in terms of reduced soil erosion and improved water quality. As well, determine the attitudes of professionals in the field and the impact of their attitudes on the problems of pollution resulting from agricultural activities and the implementation of on-farm remedial measures.

2.1 Study Objectives:

2.1.1 To interview farmers with existing on-farm remedial measures to determine the factors which affect the direct and indirect costs.

2.1.2 To locate and interview farmers with current problems to determine their perceived costs (direct and indirect) of correcting the problem and to determine how this affects their decision to implement remedial measures.

2.1.3 To undertake a mail-out random survey of farmers to evaluate the effectiveness of existing on-farm structural and agronomic remedial measures installed in the Thames River Basin for reducing soil erosion, stream sedimentation and phosphorous loads to streams.

2.1.4. To define site characteristics and/or soil management factors which determine the effectiveness of remedial measures.

2.1.5 To establish criteria required to assist in making site specific recommendations for the control of non-point source pollution.

2.1.6. To interview professionals (i.e. Agricultural Engineers, Agricultural Representatives, Soils & Crops Specialists, Drainage Commissioners and Drainage Contractors) and local elected councils to determine their attitudes towards the problems of water pollution from agricultural soil erosion and/or runoff, and their approach to remedial measures.

2.1.7. To evaluate the effect of professionals on the acceptability and installation of on-farm remedial measures.

3.0 SIGNIFICANCE OF THE STUDY

This report provides a better understanding of how existing remedial measures may be made more attractive and marketable. The results of this project are valuable to the following:

3.1 Extension Personnel: This document will allow extension workers to better understand how to sell soil conservation practices to farmers. Information provided by this study establishes criteria which will guide in the selection of practices for both demonstration projects and individual farmer assistance. It outlines facts that are acceptable and not acceptable to farmers. In addition, extension personnel are provided with insight into what factors farmers consider when faced with decisions concerning soil conservation.

3.2 Researchers: In order for soil conservation practices to become more acceptable, existing problems or "barriers to acceptance" must be identified. These problems can then be resolved or bypassed through research. This report outlines problems, as perceived by farmers, associated with specific conservation practices. In addition, this document provides guidance in formulating hypotheses and determining where research efforts should be directed.

4.0 STUDY METHODOLOGY

4.1 Study Area: This study was conducted in the Thames River Basin (see Map 1 pg. 6). Due to it's extent, the basin is characterized by a wide variety of topographies, soil types and agricultural enterprises. Therefore, the study results have a high degree of applicability to other regions of Ontario.

The Upper Thames region falls primarily within the counties of Oxford, Perth and Middlesex. The principal characteristics of this region include relatively rolling topography, predominantly clay loam and silt loam soils and an emphasis on mixed farming.

The Lower Thames River region falls within the counties of Kent, Essex and Elgin. The topography of this area is very level. Three soil types; sands, sandy loams and clays are predominant. Production emphasis is on intensive cash cropping while dairy and beef operations are few in number in this region.

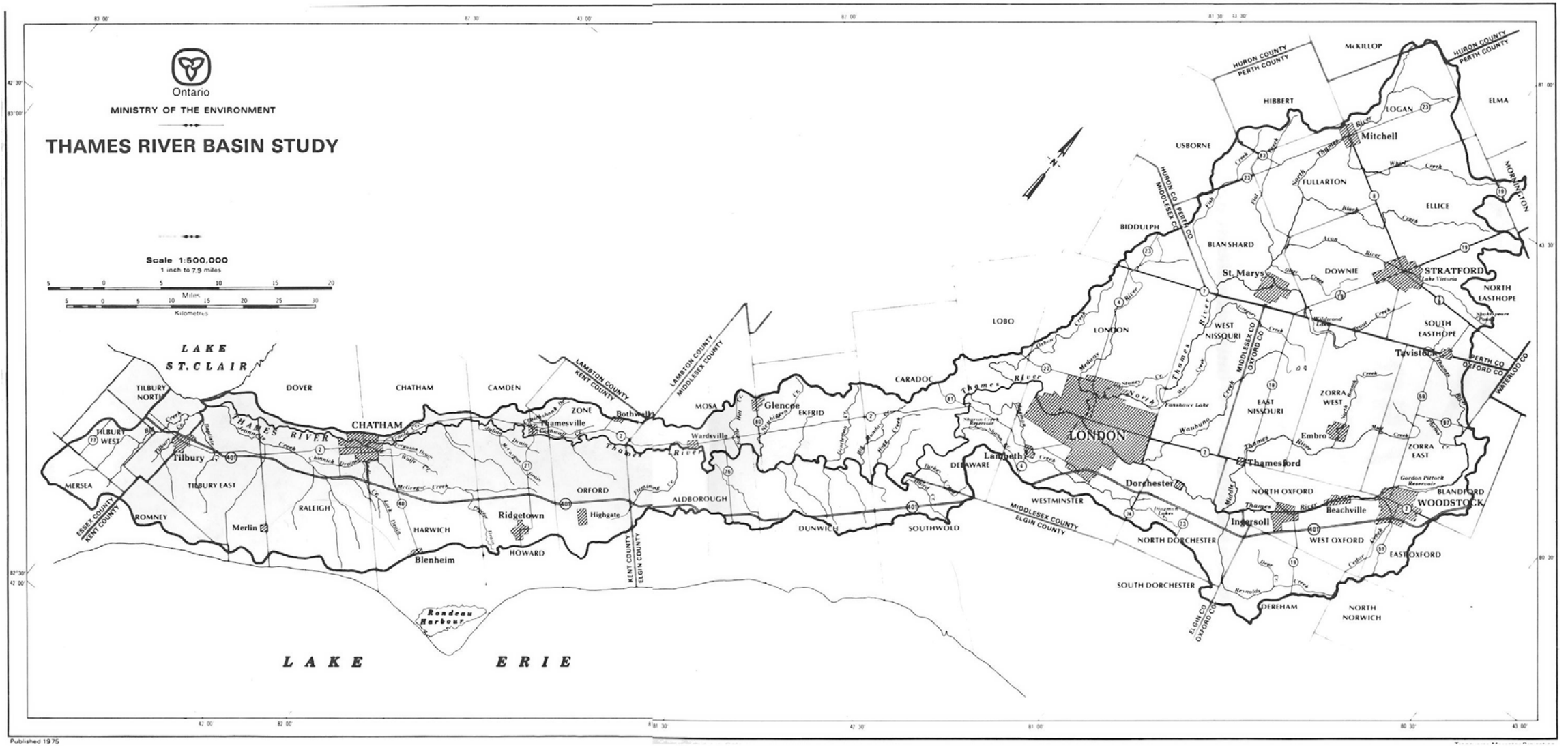
4.2 Survey # 1: Farm Interviews - Conservation Practices in Place:

4.2.1 Population Sampling: Eighty-two farmers with one or more of the following practices on their farms were located through referrals from various organizations (i.e. TRIC, O.M.A.F.):

- Buffer Strips
- Conservation Tillage (chisel plough, mulch tiller)
- Controlled Livestock Access
- Sod-based Crop Rotation
- Drain Protection (re-sloping banks, rip-rap, etc.)
- Grassed Waterways
- Tree Windbreaks

The farmers were contacted by letter (see Appendix 1, pg.45). Each farmer was called two weeks later to arrange an interview. Personal interviews took thirty to forty-five minutes. All interviews were during June, 1981 to November, 1981.

4.2.2 Data Collection Methods: Each participant identified the benefits and indirect costs of his/her conservation practice. Reaction cards(5" X 7",plastic laminated) were used to stimulate the farmers' thoughts. A reaction card was made for each of the seven practices involved in this survey. Reproductions of the cards have been included in this report (see Appendix 2, pg.46). Indirect costs of a practice are listed on one side of the card and the direct benefits on the other. Individual benefits and costs were assigned letters for the sake of simple recording. At the beginning of each interview the farmers were handed the card relevant to their practice. They were asked to either agree or disagree with the benefits and indirect costs listed on the card. The farmers placed a significance or importance weighting on each of the benefits and indirect costs cited.


Ontario
MINISTRY OF THE ENVIRONMENT
THAMES RIVER BASIN STUDY
Scale 1:500,000
1 inch to 7.9 miles
Miles
Kilometres
LAKE ST. CLAIR
LAKE ERIE
TILBURY NORTH
TILBURY WEST
Tilbury
MERSEA
TILBURY EAST
ROMNEY
RALEIGH
Merlin
DOVER
CHATHAM
CAMDEN
ZONE
Thamesville
Bothwell
HARWICH
Blenheim
Ridgetown
HOWARD
ORFORD
Highgate
ALDBOROUGH
DUNWICH
SOUTHWOLD
Rondeau Harbour
MOSA
Glencoe
EKFRID
Wardsville
CARADOC
LOBO
LONDON
Lambeth
DELAWARE
WESTMINSTER
Dorchester
NORTH DORCHESTER
SOUTH DORCHESTER
DEREHAM
NORTH NORWICH
Ingersoll
NORTH OXFORD
WEST OXFORD
EAST OXFORD
Beachville
BLANDFORD
WOODSTOCK
Embro
ZORRA WEST
ZORRA EAST
EAST NISSOURI
WEST NISSOURI
Thamesford
Tavistock
NORTH EASTHOPE
SOUTH EASTHOPE
STRATFORD
DOWNIE
ELLICE
St. Marys
BLANSHARD
BIDDULPH
FULLARTON
USBORNE
Mitchell
HIBBERT
McKILLOP
LOGAN
ELMA
MORNINGTON
Fanshawe Lake
Gordon Pittock Reservoir
Published 1975

Direct costs of the practice were gathered where possible. Many of the farmers interviewed had a difficult time remembering how much they had spent on a practice. In order to overcome this, dollar categories were included on the reaction cards. The farmers could indicate the approximate range of his expenditure to the best of his/her ability.

Information on technical and financial assistance, construction and effectiveness was collected where relevant and/or possible from each of the farmers interviewed. In addition, 35 mm photographs were taken of the practices.

All data gathered from personal interviews were recorded on a standard questionnaire developed to establish common criteria for obtaining information from participating farmers (see Appendix 3, Pg. 60). Due to the large number of variables affecting the suitability of conservation tillage, a supplementary survey questionnaire was used for this practice (see Appendix 4, pg.63).

4.3 Survey # 2 : Farm Interviews - Farmers With Erosion Problems:

4.3.1 Population Sampling: Farmers with erosion problems were located by referrals (i.e. T.R.I.C., O.M.A.F.) and by random field investigation. This survey was undertaken concurrently with Survey # 1. However, due to time constraints and problems with locating suitable and co-operative participants, this survey was less intensive.

A total of thirteen farmers with one or more of the following erosion problems were interviewed:

Gully
Rill
Sheet
Wind
Livestock Access to Streams and Ditches

4.3.2 Data Collection Methods: Data collection was undertaken by personal interview. Significant information was recorded on standardized survey sheets (see Appendix 5, pg.67).

4.4 Survey # 3: Random Mail Out Survey:

4.4.1 Population Sampling: The respondents for this survey were a random sample of farmers from thirteen selected townships located in the Thames River Basin. The townships surveyed in the Lower Thames River region include Howard, Romney, Zone, Raleigh and Aldborough.

4.4 **Survey # 3: Random Mail Out Survey**- continued

The townships surveyed in the Upper Thames River region include North Easthope, South Easthope, Logan, Zorra, London, West Nissouri, Downie, and East Zorra-Tavistock. A total of five-hundred and twenty-five names were selected at random from the 1981 Farm Tax Reduction Program list.

4.4.2 Data Collection Methods: A standard questionnaire was developed to assess the effectiveness and farmer acceptability of the following practices:

- Grassed waterways designed and constructed by experts (shaped, tiled, seeded to grass)
- Natural waterways left as is and seeded to grass.
- Natural waterways planted to crops and left unploughed.
- Catch basins
- Sod-based crop rotation
- Chisel plough to keep trash on surface for wind and sheet erosion
- Moldboard ploughing without trash covers
- Ploughing across slopes
- Winter cover crop
- Tree Windbreaks
- Disc rather than moldboard plough
- All ploughing left until spring
- Grass buffer strips
- Drop inlets
- Re-sloped and seeding ditch banks
- Field stone piled in cuts
- Sacked concrete
- Gabion baskets
- Fencing livestock out of streams and ditches

The questionnaire, along with an introductory letter, was mailed to participating farmers on November 4th,1981. Each questionnaire was coded in order to record who had returned the survey and who had not. The coding system allowed for a follow up letter to be sent to those who had not responded to the survey by December 4th,1981. Reproductions of the survey questionnaire, introductory letter and follow-up letter are included in Appendices 6, 7, 8 (pgs.68, 74 & 75).

Information received back was coded and processed by computer to yield the results presented in this document. To make the results more meaningful, the raw data were analyzed according to geographic regions (Upper Thames River region/Lower Thames River region). The computer analysis involved simple tabulation and correlation techniques.

4.5 Assessment of Perceptions and Attitudes of Professionals:

Copies of the rough draft of Survey #1 were sent to seven Soils and Crops Specialists, seven Agricultural Engineers, two researchers and four administrators for comments with respect to their attitudes towards soil conservation practices.

In addition, several informal interviews were held with elected council members and professionals associated with soil conservation related programs and agencies.

5.0 FINDINGS

5.1 Survey # 1 - Farm Interviews - Conservation Practices in Place

5.1.1 Sod Based Crop Rotation: Sample Population = 6

BENEFITS- " SELLING POINTS"

		% of Farmers Agreeing With OR Suggesting This Benefit (N = 6)	Average Importance/Significance Level				
			Not Important				Very Important
			0	1	2	3	4
A	Reduced erosion	66%			3.75		
B	Better soil structure	100%			3.33		
C	Better Subsequent yields	100%			4.00		
D	Reduced disease problems	66%			3.25		
E	Easier weed control	50%			3.30		
F	Reduced pesticide costs	83%			3.40		
G	Better distribution of labour, equipment usage and risk	83%			3.00		
H	Reduced energy requirements	17%			4.00		
I	Soil saved for future generations	83%			3.40		
J	Reduced fertilizers costs	66%			3.75		
K	Improved water quality	17%			3.00		

INDIRECT COSTS - "BARRIERS TO ACCEPTANCE"

		% of Farmers Agreeing With Or Suggesting This Cost (N = 6)	Average Importance/Significance Level				
			Not Important				Very Important
			0	1	2	3	4
A	Low profitability	50%			3.7		
B	Incompatible with existing farm operation	0%			0		
C	Greater machinery requirements	33%			2.5		
D	Greater land base required	0%			0		

EFFECTIVENESS

	Yes-Major	Yes-Minor	No	Don't Know	Total
Has your soil erosion problem been reduced?	4	2	-	-	6

DISCUSSION

Sod-based crop rotation is a very effective soil conservation measure. The many benefits of this practice are undisputed in the farming community. Therefore, it follows that sod based crop rotation has a high potential acceptability. Although a majority of the farmers interviewed during Survey #1 rotated their crops, very few included forages in their rotation. Cash crop farmers are very reluctant to include forages in their cropping system for three reasons. A farmer will not grow a forage crop unless he is assured of a stable market. In the Lower Thames River Region, cattle operations are very few resulting in a weak demand for forage crops. Many cash croppers believe that forage production is uneconomical in the short run. Forage production in a cash crop system means a greater inventory of implements or resorting to expensive custom work. However, red clover plow down crops after cereals appears to be growing in popularity with cash croppers. This practice serves as a compromise between growing forages and not rotating at all.

READER'S CAUTION

- The benefits and indirect costs listed in this section may be relevant to other cases depending on site-specific factors such as soil type, machinery, crop grown, management factors, etc.
- The benefits and indirect costs listed in this section reflect farmers' perceptions through experience.

5.1.2 Conservation Tillage : Sample Population = 36

BENEFITS - " SELLING POINTS "

	% of Farmers Agreeing With Or Suggesting This Benefit (N = 36)		Average Importance/Significance Level				
			Not Important				Very Important
			0	1	2	3	4
A	Reduced water erosion	69%			3.8		
B	Reduced wind erosion	64%			3.4		
C	Reduced energy requirements	56%			3.7		
D	Improved soil structure	39%			2.7		
E	Time saved	50%			3.2		
F	Soil saved for future generations	72%			3.8		
G	Improved water quality	47%			2.2		
H	Improves drainage	17%			3.4		
I	No skilled ploughman required to operate conservation tillage implements	11%			3.0		
J	Conservation tillage implements	8%			-		

	% of Farmers Agreeing with Or Suggesting This Benefit (N = 36)		Average Importance/Significance Level				
			Not Important				Very Important
			0	1	2	3	4
K	Reduced work load in spring	6%			3.5		
L	Eliminates headlands	8%			3.4		
M	Conservation tillage implements serve as leveling tools				2.0		
N	Dead furrows are eliminated	6%			3.5		
O	Wind damage to crops is reduced	3%			3.0		
P	Increases rate of decomposition of trash relative to conventional ploughing	3%			3.0		

INDIRECT COSTS - "BARRIERS TO ACCEPTANCE"

	% of Farmers Agreeing With Or Suggesting This Cost (N = 36)		Average Importance/Significance Level				
			Not Important				Very Important
			0	1	2	3	4
A	Decreased yields (see analysis of supplementary) data	17%			3.8		
B	Need to use more herbicide (see data) analysis of supplementary	3%			3.0		
C	Conservation implements plug up in heavy trash	6%			3.0		
D	Conservation tillers are dry land implements	14%			3.2		
E	Conservation tillage requires a large amount of horse power	8%			3.3		
F	Fields dry out quicker making planting more difficult (see analysis of data) supplementary	3%			3.0		
G	Conservation tillage results in lower soil temperatures in early spring	3%			3.0		
H	Trash left on surface ties up nitrogen	3%			3.0		
I	Conservation tillage implements do not incorporate dry cattle manure satisfactorily	6%			3.5		
J	Germination and emergence problems (see analysis of supplementary	11%			3.2		

K	Psychological barriers to accepting rough looking fields	3 %	2.0
L	Not enough competent assistance and information available to farmers who are just learning to use conservation tillage equipment to best advantage	3 %	2.0

SUPPLEMENTARY DATA ANALYSIS

1) Influences that prompted the interviewees to change from conventional tillage to conservation tillage:

	(N = 36)	%
A) Neighbour	15	42%
B) Demonstration	5	14 %
C) News media	3	8 %
D) Government Ext. Personnel	6	17 %
E) Machinery dealer	4	11 %
F) Personal Experience with erosion	2	6 %
G) Soils & Crops Improvement Association	1	3 %
	36	100 %

2) TABLE 1

Satisfaction with the way conservation tillage implements work the soil (correlated with soil type). N = 36

Soil Type	No. of farmers Satisfied	Not Satisfied
sand	2	-
sandy loam	6	-
silt loam	3	1
clay loam *	17	3
heavy clay	3	1
Totals	31 (86 %)	5 (14 %)

* Six farmers located on clay loam soils indicated they were only satisfied after more than one pass over their fields with their conservation tillage implement.

3) TABLE 2

Planting, weed control, disease problems and insect problems associated with conservation tillage. (N = 36)

	NO	YES	DON'T KNOW
Have you experienced extra problems with weed control?	23	9	4
Have you experienced extra problems planting in heavier residue?	29	7	-
Have you experienced extra problems with insects?	33	3	-
Have you experienced extra problems with disease?	36	-	-

4) YIELDS: The farmers interviewed were asked the following question: "In relation to your experience with conventional tillage, do you feel your yields are significantly less, about the same or significantly greater (correlated to soil types)?".

TABLE 3

Farm Type	Significantly Less ($\leq$5 %)	About the Same	Significantly Greater ($\geq$5 %)
Sand	1	1	-
Sandy Loam	-	5	1
Silt Loam	1	3	-
Clay Loam	5	13	2
Heavy Clay	1	2	1
Totals	8	24	4

EFFECTIVENESS

	Yes- Major	Yes -Minor	No	Don't Know	Total
Has your soil erosion problem been reduced?	20	9	4	3	36

DISCUSSION

Conservation tillage is a relatively new concept to the farmers of Ontario. A common complaint is that there is little technical guidance and advice available to those interested in conservation tillage. One farmer interviewed, traveled to the United States to obtain information before investing in a mulch tiller. Many farmers who invest in conservation implements are forced to use them on a trial and error basis. As a result, mulch tillers are used when the soil is too wet or are planted deeper than what is recommended, etc. The misuse of conservation implements, through lack of knowledge, leads to farmers abandoning the conservation tillage concept after one or two seasons.

Farmer acceptability of conservation tillage is heavily dependent on soil types. In many townships in the Lower Thames River region where light sandy soils are dominant, minimum tillage is the rule rather than the exception. However, in the Upper Thames River region heavier soils are common and minimum tillage is less popular.

A majority of farmers interviewed were involved in conservation tillage for advantages other than the inherent soil saving benefits. For example, given the ideal conditions (i.e. soil type, etc.) conservation tillage can be economical and time saving. Erosion control is often viewed as a secondary benefit.

5.1.3 Buffer Strips: Sample Population = 3

BENEFITS - "SELLING POINTS"

	% of Farmers Agreeing with Or Suggesting This Benefit (N = 3)		Average Importance/Significance Level				
			Not Important				Very Important
			0	1	2	3	4
A	Keeps bank structure stable; reduces drain maintenance	100 %			4.0		
B	Removal of a hay crop from buffer	0%			-		
C	Improves water quality	33%			3.0		
D	Improves wildlife habitat	33 %			2.0		
E	Helps reduce hazards to machinery (i.e. overturning in drain or stream)	100%			3.7		
F	Saves soil for future generations	100%			3.7		

INDIRECT COSTS - " BARRIERS TO ACCEPTANCE

	% of Farmers Agreeing With or Suggesting This Cost (N = 3)		Average Importance/Significance Level				
			Not Important				Very Important
			0	1	2	3	4
A	Takes land out of production	33 %			0		
B	Needs mowing/maintenance	0 %			-		
C	Weed problems	0 %			-		

DIRECT COSTS

All three farmers indicated that their buffer strips consisted of natural vegetation and thus required no capital costs for implementation.

EFFECTIVENESS

	Yes-Major	Yes-Minor	No	Don't Know	Total
Has your soil erosion problems been reduced?	1	2	0	0	3

DISCUSSION

The major site specific characteristic which determines the acceptability of buffer strips is width. The wider a buffer strip, the more it will be viewed as an unnecessary waste of productive land. The Ontario Design and Construction Guidelines (1981) for work under the drainage act recommends that buffer strips should be at least five meters wide (pg.39). Many farmers feel this is too wide. This specification could be a constant source of conflict and difficult to enforce.

All three buffer strips examined were uncultivated strips of land left to natural vegetation. Hay is never taken off these strips as is suggested by the aforementioned document. This practice is considered unprofitable and unnecessary by all three farmers interviewed. One farmer mentioned that he would be in danger of rolling his implements into the adjacent drain if he mowed and baled his buffer strip.

5.1.4. Grassed Waterways : Sample population = 21

BENEFITS - " SELLING POINTS "

	% of Farmers Agreeing With or Suggesting This Benefit(N = 21)		Average Importance/Significance Level				
			Not Important				Very Important
			0	1	2	3	4
A	Reduces rill erosion	100 %			3.7		
B	Removal of a hay crop	29 %			2.0		
C	Reduction in Hazards to machinery	81 %			2.6		
E	Improves water quality	57 %			1.8		

Soil saved for future generation	100 %	3.7
Field looks better (versus gully)	71 %	2.5
Increased farm income	71 %	3.2
Protection of tiles under waterway	86 %	3.6

INDIRECT COSTS - "BARRIERS TO ACCEPTANCE"

	% of Farmers Agreeing With or Suggesting This Cost (N = 21)		Average Importance/Significance Level				
			Not Important				Very Important
			0	1	2	3	4
A	Land taken out of Production	86 %			1.0		
B	Inconvenience of farming the field	38 %			1.3		
C	Mowing	48 %			0.9		
D	Weed control	19 %			1.0		

DIRECT COSTS

Twelve of the twenty-one grassed waterways examined were natural draws in fields overgrown by vegetation. No artificial shaping and seeding were involved. Therefore, direct costs were unavailable. Direct costs of the constructed waterways varied between $3.50 and $1.80 per linear foot. Costs fluctuated according to how elaborate each waterway was. The most costly waterway involved not only bulldozing, but also the installation of sub-surface drainage, a catch basin and a rock chute. The least expensive, involved simple bulldozing to form a dish shaped channel and seeding.

EFFECTIVENESS

		Yes-Major	Yes-Minor	No	Don't Know	Total
Has your soil erosion problem been reduced?	Natural Waterways	12	0	0	0	12
	Constructed Waterways	8	1	0	0	9
					Total	21

DISCUSSION

When farmers consider constructing a grassed waterway their main concern is usually dimensions. They are concerned about how much land will be taken out of production. Therefore, it is important that they understand why waterways are the dimensions proposed. The basic principles grassed waterway design must be explained (i.e. S.C.S. METHOD, RATIONAL METHOD, ETC.).

Once a waterway has been constructed farmers must be given guidance in the proper management of the structure as it relates to farming activities on the field. For a grassed waterway to reach maximum effectiveness, ploughing and planting must be done perpendicular to the waterway. The ends of the furrows should be staggered. This allows for water to run along the furrows and rows and into the grassed waterway.

The maintenance of grassed waterways is a very low priority to the farmers interviewed. They feel that mowing and baling their waterways is not worthwhile. The costs in time and money outweigh the benefits. In some cases, the farmers did not have access to the machinery required.

Natural draws planted to crops but left unploughed in the fall appears to be very popular. This practice does not withdraw land from production and residue left over winter provides erosion protection against spring run-off. This type of approach to soil conservation demonstrates farmers' preference for simple, inexpensive yet effective erosion control practices.

5.1.5. Windbreaks : Sample Population = 7

BENEFITS - "SELLING POINTS"

		% of Farmers Agreeing With Or Suggesting This Benefit (N = 7)	Average Importance/Significance Level				
			Not Important			Very Important	
			0	1	2	3	4
A	Reduces wind erosion	86 %			3.5		
B	Reduces heating costs	100 %			3.7		
C	Increased crop yields	71 %			3.6		
D	Increased crop quality	71 %			2.4		
E	Makes farm look better	100 %			3.4		
F	Helps control snow drifts	100 %			3.6		
G	Saves soil for future generations	71 %			3.8		
H	Ecological benefits (wildlife habitat)	86 %			3.8		

INDIRECT COSTS - "BARRIERS TO ACCEPTANCE"

		% of Farmers Agreeing With Or Suggesting This Cost (N = 7)	Average Importance/Significance Level				
			Not Important			Very Important	
			0	1	2	3	4
A	Withdraws land from production	57 %			0.4		
B	Time needed for trees to grow to be effective	43 %			1.0		
C	Maintenance required	57 %			1.0		

DIRECT COSTS

All of the farmers interviewed obtained trees at a nominal fee (present cost = 2.50/tree), either directly from the Ministry of Natural Resources or through their conservation authority.

EFFECTIVENESS

	Yes-Major	Yes-Minor	No	Don't Know	Total
Has your wind erosion problem been reduced?	1	1	0	5	7

DISCUSSION

Tree windbreaks are highly acceptable to farmers of the Thames River Basin. They are very common in the Lower Thames River region where wind erosion is a concern. Windbreaks are viewed as being very effective in reducing wind erosion and protecting crops from wind damage provided the appropriate species of trees (i.e. evergreens, poplar) are selected and planted in strategic locations (i.e. perpendicular to prevailing winds). This high acceptance can be attributed to the low cost of windbreak stock and the technical assistance provided by provincial government programs in establishing windbreaks. The many other benefits of windbreaks (i.e. aesthetics, snow management, etc.) are very attractive to farmers. However, there were several complaints about the low availability of trees and long waiting periods before orders are filled.

5.1.6 Controlled Livestock Access: Sample Population = 3

BENEFITS - "SELLING POINTS"

	% of Farmers Agreeing With Or Suggesting This Benefit(N = 3)	Average Significance/Importance Level (Not Important 0 1 2 3 4 Very Important)
A	Reduced bank destruction erosion 100 %	3.3
B	Reduced drain/stream maintenance 33 %	3.0
C	Easier herd management 66 %	4.0
D	Aesthetics/Farm looks better 66 %	3.0
E	Improved Water quality 33 %	4.0
F	Reduced herd sickness due to contaminated water 33 %	4.0

INDIRECT COSTS - "BARRIERS TO ACCEPTANCE"

- none cited

DIRECT COSTS

All three controlled cattle accesses were built several years ago and the owners were unsure of the direct costs. Moreover, on-farm materials (i.e. posts, silo concrete, etc.) were used in all three cases.

EFFECTIVENESS

	Yes-Major	Yes-Minor	No	Don't Know	Total
Has your soil erosion problem been reduced?	2	1	0	0	3

DISCUSSION

The high cost of fencing appears to be the main reason for the rather low acceptability of controlled livestock access. However, two of the farmers interviewed felt their investment had been recouped in terms of money saved in drain maintenance. The third farmer erected fencing after two head of cattle were poisoned as the result of a herbicide spill upstream from his farm.

5.1.7 Drain Protection (resloping banks,rip-rap, etc.) Sample Population = 6

BENEFITS - "SELLING POINTS"

	% of Farmers Agreeing With or Suggesting This Benefit (N = 6)		Average Importance/Significance Level (Not Important 0 1 2 3 4 Very Important)
A	Reduced bank erosion	100 %	3.7
B	Drain looks better	50 %	3.0
C	Reduced hazard to machinery and life	66 %	3.5
D	Reduced drain maintenance costs	100 %	3.7
E	Improved water quality	33 %	2.5
F	Improved drain efficiency	100%	4.0

INDIRECT COSTS - "BARRIERS TO ACCEPTANCE"

	% of Farmers Agreeing With or Suggesting This Cost(N = 6)		Average Importance/Significance Level (Not Important 0 1 2 3 4 Very Important)
A	Land withdrawn from production	33 %	2.5
B	Inconvenience caused by spoil bank	83 %	3.0
C	Destruction of wildlife habitat	33 %	2.0

DIRECT COSTS

Remedial measures such as gabion baskets and rip-rapping were found to be relatively labour intensive. However, the effect of these structures on the total cost of a drainage project is variable. On small private drains gabion baskets and rip-rap may make up a significant percentage of the total cost. On larger municipal projects the costs associated with these structures may be quite modest relative to total costs.

Mulching freshly cut drain banks after seeding is not common. This is due to the low availability and high expense of machinery equipped to undertake this task. The other alternative is to have mulch spread and anchored by hand. On larger drains this is a very costly proposition. As a result, many engineers choose to eliminate this step.

EFFECTIVENESS

	Yes-Major	Yes-Minor	No	Don't Know	Total
Has your soil erosion problem been reduced?	5	1	0	0	6

DISCUSSION

Four of the six farmers interviewed felt that they were not given a satisfactory opportunity to contribute to the planning process of their project. It is a common sentiment among all six farmers that landowner input is often disregarded by those responsible for drawing up drainage reports. The provincial Design and Construction Guidelines (1981) should provide a focal point for increased co-operation between landowners and drainage engineers. Conflicts will be minimized if the specifications outlined in the guidelines are presented and discussed at on-site meetings.

5.2 Survey # 2: Farm Interviews - Farmers With Erosion Problems

Thirteen farmers were interviewed; one with a gully problem, three with rill erosion problems, three with sheet erosion problems and six with cattle having access to either a stream or a ditch.

Gully: The farmer with the gully problem indicated that he did not have sufficient knowledge to remedy the problem. He felt professional advice was needed but was confused as to where to get it.

Rill: All three farmers recognized the rill erosion on their farms as being a problem. However, none of them felt they could justify withdrawing a portion of their high priced land for grassed waterways. In all cases, serious rills are filled in with adjacent topsoil by a tractor and blade apparatus. Crops are planted over these areas. One farmer's rational for such action was that the large amount of rain that caused the rills the previous spring was very unusual and unlikely to occur again in the near future.

Grassed waterways reduce rill erosion and provide protection to underlying tiles.

No-till Waterway: A natural draw left unploughed. This practice is highly acceptable to farmers.

5.2 - Continued

Sheet: All three farmers did not recognize sheet erosion as being a problem on their farms. In fact, two of them did not know what sheet erosion was.

Cattle Access: All six farmers indicated that their problem was not severe enough to warrant investing in high priced fencing and alternate watering facilities. Water quality related problems are of little concern to the majority. The general consensus is that it is unacceptable for farmers to bear the cost of fencing cattle out of watercourses for the benefit of downstream neighbours and society in general.

5.3 Survey # 3 : Random Mail Out Survey

5.3.1 Response rate:

UPPER THAMES RIVER REGION

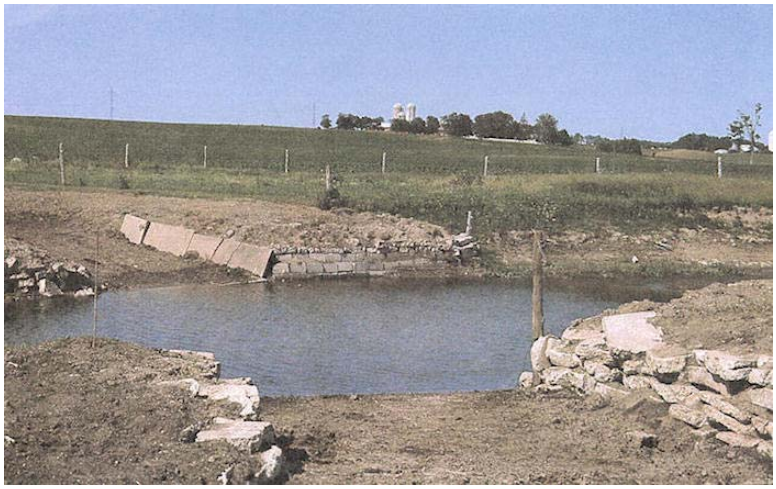
Township	Number of Surveys Sent	Number of Surveys Returned
East Zorra Tavistock	27	12 (44 %)
Downie	39	19 (49 %)
Logan	35	16 (46 %)
London	49	25 (51 %)
North Easthope	40	28 (70 %)
South Easthope	36	22 (61 %)
West Nissouri	26	10 (38 %)
Zorra	58	31 (53 %)
Sub-totals	310	163 (53 %)

LOWER THAMES RIVER REGION

Township	Number of Surveys Sent	Number of Surveys Returned
Aldborough	37	16 (43 %)
Howard	52	28 (54 %)
Raleigh	57	31 (54 %)
Romney	24	13 (54 %)
Zone	45	3.0 (6.7 %)
Sub-totals	215	118 (54 %)
Totals (Upper & Lower)	525	281 (54 %)

A tree windbreak which reduces wind erosion and protects crops from wind damage.

An open drain with properly sloped and protected banks.



A controlled cattle access which was constructed from materials found on most farms.

COMMENTS

- The very high response rate in North Easthope Township may be explained by the following:
  1. The rolling topography which is characteristic of the area contributes to an above average consciousness of soil erosion.
  2. The demonstration activities of the Stratford Avon River Environmental Management Project (S.A.R.EM.P.) has increased farmer interest in soil conservation.
- The high response rate in Zone Township can be attributed to the predominantly sandy soils of this area which are very susceptible to wind erosion. Conservation tillage is very common and acceptable in this township.

5.3.2 General Acceptability of Soil Conservation Practices

GULLY EROSION

A. Grassed water runs designed and constructed by experts(shaped, tiled, seeded to grass):

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	87	37	124 (44 %)
Effective but not acceptable	32	27	59 (21 %)
Not effective	0	0	0
Not familiar with practice	38	47	85 (30 %)
No response	6	7	13 (5 %)
			281

B. Natural water runs left as is and seeded to grass:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	114	53	167 (59 %)
Effective but not acceptable	25	23	48 (17 %)
Not effective	5	3	8 (3 %)
Not familiar with practice	14	33	47 (17 %)
No response	5	6	11 (4 %)
			281

C. Natural water runs planted to crops and left unploughed:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	63	40	103 (37 %)
Effective but not acceptable	31	12	43 (15 %)

Not effective	43	30	73 (26 %)
Not familiar with practice	20	30	50 (18 %)
No response	6	6	12 (4 %)
			281

D) Catch basins:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	72	78	150 (53 %)
Effective but not acceptable	23	7	30 (11 %)
Not effective	24	9	33 (12 %)
Not familiar with practice	36	16	52 (19 %)
No response	8	8	16 (5 %)
			281

SHEET (FIELD) EROSION

A) TABLE 4

Sod based crop rotation - number and percentages of farmers agreeing without regard to Upper/Lower Thames Regions (N = 267, 14 missing observations). Correlated to farm type.

Farm Type	Effective	Effective but not Acceptable	Not Effective	Not Familiar With Practice
Dairy and/ or Beef	65 PF = 86% PT = 24%	1 PF =1% PT = 0.4%	1 PF =1% PT = 0.4%	9 PF = 12% PT =3%
Cash Crop and dairy or Beef	8 PF = 80% PT =3%	1 PF = 10% PT = 0.4%	0 PF =0% PT =0%	1 PF = 10% PT =0.4%
Other (i.e. cash crop, swine, poultry, etc.	107 PF = 59% PT = 40%	42 PF = 23% PT = 16%	1 PF =1% PT = 0.4%	31 PF = 17% PT = 12%

PF = Percentage of farmers by farm type
PT = Percentage of total population

B) TABLE 5:

Chisel Plough - number and percentages of farmers agreeing without regard to Upper/Lower Thames Regions (N = 268, 13 missing observations). Correlated to soil type.

Soil Type	Effective and Acceptable	Effective But Not Acceptable	Not Effective	Not Familiar With Practice
Sand	20 PS = 91 % PT =8 %	0 PS =0 % PT =0 %	0 PS =0 % PT =0 %	2 PS =9 % PT =1 %
Sandy Loam	44 PS = 61 % PT = 16 %	9 PS = 13 % PT =3 %	5 PS =7 % PT =2 %	14 PS = 19 % PT =5 %
Clay	7 PS = 30 % PT =3 %	6 PS = 26 % PT =2 %	3 PS = 13 % PT =1 %	7 PS = 30 % PT =3 %
Clay Loam	51 PS = 34 % PT = 19 %	36 PS = 24 % PT = 13 %	18 PS = 12 % PT =7 %	45 PS = 30 % PT = 17 %

PS = Percentage of farmers by soil type.

C) TABLE 6:

Mulch Tiller - number and percentages of farmers agreeing without regard to Upper/Lower Thames Regions (N = 260, 21 missing observations). Correlated to soil type.

Soil Type	Effective and Acceptable	Effective But Not Acceptable	Not Effective	Not Familiar With Practice
Sand Sand	18 PS = 82 % PT =7 %	0 PS =0 % PT =0 %	0 PS =0 % PT =0 %	4 PS = 18 % PT =2 %
Sandy Loam	34 PS = 49 % PT = 13 %	7 PS = 10 % PT =3 %	5 PS =7 % PT =2 %	23 PS = 33 % PT =9 %
Clay	6 PS = 26 % PT =2 %	4 PS = 17 % PT =2 %	4 PS = 17 % PT =2 %	9 PS = 39 % PT =4 %
Clay Loam	35 PS = 24 % PT = 14 %	27 PS = 19 % PT = 10 %	17 PS = 12 % PT =7 %	66 PS = 45 % PT = 25 %

D) TABLE 7

All ploughing left until spring - number and percentages of farmers agreeing without regard to Upper/Lower Thames Regions (N = 264, 17 missing observations). Correlated to soil type.

Soil Type	Effective and Acceptable	Effective But Not Acceptable	Not Effective	Not Familiar With Practice
	9	7	4	2
Sand	PS = 41 %	PS = 32 %	PS = 18 %	PS =9 %
	PT=3%	PT=3%	PT=2%	PT=1 %
	27	28	7	9
Sandy	PS = 38 %	PS = 39 %	PS = 10 %	PS = 13 %
Loam	PT = 10 %	PT = 11 %	PT=3%	PT=3%
	2	12	2	7
Clay	PS =9 %	PS = 52 %	PS =9 %	PS = 30 %
	PT =1 %	PT =5 %	PT =1 %	PT =3 %
Clay	16	72	32	27
Loam	PS = 11 %	PS = 49 %	PS = 22 %	PS = 18 %
	PT =6 %	PT = 27 %	PT = 12 %	PT = 10 %

E) Moldboard plough without trash covers:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	68	53	121 (43 %)
Effective but not acceptable	24	10	34 (12 %)
Not effective	29	31	60 (21 %)
Not familiar with practice	31	17	48 (17%)
No response	11	7	18 (6%)
			281

F) Ploughing across slopes:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	82	53	107 (38 %)
Effective but not acceptable	21	10	34 (12 %)
Not effective	18	31	42 (15 %)
Not familiar with practice	32	17	79 (28 %)
No response	10	7	19 (7 %)
			281

G) Shallow ploughing:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	39	38	77 (27 %)
Effective but not acceptable	20	10	30 (11 %)
Not effective	55	37	92 (33 %)
Not familiar with practice	35	25	60 (21 %)
No response	14	8	22 (8 %)
			281

H) Winter cover crop:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	69	70	139 (50 %)
Effective but not acceptable	40	21	61 (22 %)
Not effective	4	0	4 (1 %)
Not familiar with practice	40	20	60 (21 %)
No response	10	7	17 (*6 %)*
			281

WIND EROSION

A) Tree Windbreaks:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	119	93	212 (75 %)
Effective but not acceptable	17	9	26 (9 %)
Not effective	3	2	5 (2 %)
Not familiar with practice	16	7	23 (8 %)
No response	8	7	15 (5 %)
			281

B) Chisel plough:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	57	76	133 (47 %)
Effective but not acceptable	37	15	52 (19 %)
Not effective	9	9	14 (5 %)
Not familiar with practice	45	15	61 (22 %)
No response	14	7	21 (7 %)
			281

C) Mulch Tiller:

	Upper Thames Region	Lower Thames Region	Totals
Effective and Acceptable	46	54	100 (36%)
Effective but not acceptable	29	16	45 (16%)
Not Effective	17	7	24 (8.5%)
Not Familiar with practice	57	31	88 (31%)
No response	14	10	24 (8.5%)
			281

D) Disc Rather than Moldboard Plough:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	20	36	56 (20%)
Effective but not acceptable	35	36	71 (25%)
Not Effective	51	18	69 (25%)
Not Familiar with practice	44	17	61 (22%)
No Response	13	11	24 (8%)
			281

E) Table 8: All ploughing left until spring for wind erosion - number and percentage of farmers agreeing without regard to upper/lower Thames Regions. (N=259, 22 missing observations) Correlated to soil type.

Soil Type	Effective and Acceptable	Effective But Not Acceptable	Not Effective	Not Familiar With Practice
Sand	8 PS = 40% PT =3%	16 PS = 30% PT =2%	4 PS = 20% PT =2%	2 PS = 10% PT =1%
Sandy Loam	29 PS = 41% PT = 11%	30 PS = 42% PT = 12%	6 PS = 8.5% PT = 2.0%	6 PS = 8.5% PT = 2.0%
Clay	1 PS =5% PT = 0.5%	11 PS = 50% PT =4%	1 PS =5% PT = 0.5%	9 PS = 40% PT =4%
Clay Loam	19 PS = 13% PT =7%	75 PS = 52% PT = 29%	23 PS = 16% PT =9%	28 PS = 19% PT = 11%

Ditchbank Erosion

A) Grass Buffer strips along drain at least four feet in width:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	118	75	193 (69%)
Effective but not acceptable	10	16	26 (9%)
Not Effective	0	2	2 (1%)
Not familiar with practice	29	19	48 (17%)
No response	6	6	12 (4%)
			281

B) Drop Inlets:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	62	59	121 (43%)
Effective but not acceptable	13	8	21 (7%)
Not Effective	7	4	11 (4%)
Not familiar with practice	71	41	112 (40%)
No response	10	6	16 (6%)
			281

C) Banks re-sloped and seeded:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable100	100	69	169 (60%)
Effective but not acceptable	16	11	27 (10%)
Not effective	6	6	12 (4%)
Not familiar with practice	33	25	58 (21%)
No response	8	7	15 (5%)
			281

D) Fieldstone piled in cuts along drain or ditchbank:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable115	15	72	187 (66%)
Effective but not acceptable	13	6	19 (7%)
Not Effective	9	8	17 (6%)
Not familiar with practice	20	25	45 (16%)
No response	6	7	13 (5%)
			281

E) Sacked Concrete:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	73	57	130 (46%)
Effective but not acceptable	30	18	48 (17%)
Not Effective	7	0	7 (3%)
Not familiar with practice	43	35	78 (28%)
No response	10	8	18 (6%)
			281

F) Gabion Baskets:

	Upper Thames Region	Lower Thames Region	Totals
Effective and acceptable	89	45	134 (48%)
Effective but not acceptable	21	16	37 (13%)
Not effective	0	1	1(1%)
Not familiar with practice	43	48	91 (32%)
No response	10	8	18 (6%)
			281

G) Fencing Livestock out of Streams and Ditches:

	Upper Thames Region	Lower Thames Region	Totals
Effective and Acceptable	102	45	147 (52%)
Effective but not acceptable	31	25	56 (20%)
Not Effective	10	6	16 (6%)
Not familiar with practice	14	33	47 (17%)
No Response	6	9	15 (5%)
			281

5.3.3 Farmers' perception of soil erosion as it affects Farm Productivity

Recipients of the mail out survey were asked: "In general would you say soil erosion is affecting farm productivity in your township?" Responses are shown in Table 9.

TABLE 9: Soil erosion as it affects farm productivity (N = 281).

	Yes	No	I Don't Know	No Response
Upper Thames Region	81	56	26	0
Lower Thames Region	64	40	14	0
TOTALS	145 (52%)	96 (34%)	40 (14%)	0

5.3.4 Farmers' Perception of Soil Erosion As It Affects Water Quality

Recipients of the mail out survey were asked: "Would you say soil erosion in your township is a major contributor to water pollution?" Responses are shown in Table 10.

TABLE 10: Soil Erosion As It Affects Water Quality (N = 281).

	Yes	No	I Don't Know	No Response
Upper Thames Region	40	86	36	1
Lower Thames Region	30	66	21	1
TOTALS	70 (25%)	152 (54%)	57 (20%)	2 (1%)

5.3.5 Farmers' Perception Of The Severity Of Soil Erosion

Recipients of the mail out survey were asked to rate the severity of gully, sheet, wind and ditchbank erosion in their respective townships. Responses are shown in tables 11, 12, 13 and 14.

TABLE 11: Severity of Gully Erosion (N = 281).

	Extremely Serious	Very Serious	Minor	No Response
Upper Thames Region	35	32	54	42
Lower Thames Region	9	16	46	47
TOTALS	44 (16%)	48 (17%)	100 (35%)	89 (32%)

TABLE 12. Severity Of Sheet Erosion (N = 281).

	Extremely Serious	Very Serious	Minor	No Response
Upper Thames Region	16	29	60	58
Lower Thames Region	8	20	43	47
TOTALS	24 (9%)	49 (17%)	103 (37%)	105 (37%)

TABLE 13. Severity Of Wind Erosion (N = 281).

	Extremely Serious	Very Serious	Minor	No Response
Upper Thames Region	6	21	71	65
Lower Thames Region	32	26	42	18
TOTALS	38 (14%)	47 (17%)	113 (40%)	83 (29%)

TABLE 14. Severity Of Ditchbank Erosion (N = 281).

	Extremely Serious	Very Serious	Minor	No Response
Upper Thames Region	18	34	62	49
Lower Thames Region	14	31	47	26
TOTALS	32 (11%)	65 (23%)	109 (39%)	75 (27%)

5.3.6 Soil Erosion As A Priority On The Farm

Recipients of the mail out survey were asked: " How would you rate soil erosion control as a priority on your farm?" Responses are shown in Table 15.

TABLE 15. Soil Erosion As A Priority On The Farm (N = 281).

	High	Medium	Low	No Response
Upper Thames Region	49	63	49	2
Lower Thames Region	37	41	40	0
TOTALS	86 (31%)	104 (36%)	89 (32%)	2 (1%)

5.4 Farmers' perception of the best source of information concerning soil conservation:

Recipients of the mail out survey and the farmers interviewed in Survey # 1 were asked " What is the best source of information to you personally concerning soil conservation?" Responses are shown in Table 16.

TABLE 16: Best Source Of Information Concerning Soil Conservation (N = 281 + 82 = 363).

Source	No. of Farmers
Field Staff	59 (16%)
Factsheets	34 (9%)
Farm Magazines and Newspapers	190 (52%)
Demonstrations	21 (6%)
Neighbours	12 (3%)
Own Experience	16 (5%)
Don't Know	29 (8%)
No Response	2 (1%)
TOTAL	363

5.5 Farmers' perception of who should take the leading role in the area of soil conservation.

Recipients of the mail out survey and the farmers interviewed in Survey # 1 were asked: "Who do you feel should take the leading role in the area of soil conservation?".

TABLE 17: Farmers' perception of who should take the leading role in the area of soil conservation (N = 281 + 82 = 363).

Agency	No. of Farmers
Ontario Ministry of Agriculture & Food (OMAF)	149 (41%)
Ontario Ministry of Natural Resources (OMNR)	42 (11.5 %)
Ontario Ministry of The Environment (OME)	23 (6 %)
Conservation Authority (CA)	54 (15%)
Federal Government	3 (1 %)
OMAF and CA	7 (2%)
OMAF and OME	2 (1 %)
OMAF and MNR	1 (0.5 %)
Landowners	25 (7 %)
No Response	57 (15%)
TOTAL	363

5.6 Assessment of Perceptions and Attitudes of Professionals

Various professionals (i.e. Soils and Crops Specialists, Agricultural Engineers, etc.) were approached for comments on soil conservation. The response rate was poor. Therefore, it may be assumed that relative to other duties and responsibilities, soil conservation is of low priority to many. Generally, professionals involved in agriculture appear to be more concerned with the loss of productive land through land use planning (i.e. hydro corridors, urban sprawl, etc.) than soil loss attributed to erosion.

Several of the individuals that did respond indicated that the cost/ benefit approach to remedial measures is very useful. A farmer's livelihood depends on his management skills. Weighing the direct and indirect costs of a remedial measure against the direct and indirect benefits is a practical management strategy. Few of the professionals contacted felt that soil conservation could be sold on the basis of water quality improvement. However, elected council members appeared to be much more responsive to soil erosion as it relates to water pollution.

Concern over how to get information across to farmers was expressed by several professionals. They felt that a great amount of useful research material never reaches farmers.

One professional indicated that more attention should be given to popular, less publicized conservation practices. A farmer many not be familiar with the term "Conservation Tillage" but makes a conscientious effort to plough across slopes or reduces fall tillage. Piling field stone along fence lines and ditchbanks is a very common and often effective way of reducing erosion. This practice reflects the average farmer's approach to erosion control. To the typical farmer with an erosion problem, a pile of field stone may be viewed as a practical necessity rather than a "textbook" erosion control technique.

5.7 Farmers' Comments, Opinions and Suggestions:

Recipients of the mail out survey were asked for comments, opinions and suggestions with respect to soil conservation. The following is a representative sample of the responses. They have been recorded verbatim.

A) ECONOMICS OF SOIL CONSERVATION:

- "Soil is the future resource of all Canadian citizens, yet the economic responsibility is borne by the farmer alone. He can never see the returns in his lifetime so there is no motivation to take actions. Even though most farmers know what to do and would like to do it if they could afford to, farming is a tight game and the luxury of conservation is hard to justify at $2.50 corn. The solution! Less corn to-day for more tomorrow. Instead of price supports etc., farmers should be paid by the tax payers to grow alfalfa one year in ten or 10% per year and plough it in. Loss of soil structure is the real threat to Canada as an agricultural nation."

- "Many of these conservation practices are good. However, they are not sufficiently used by farmers because they don't want to pay the money and also because they feel they are losing acres of usable land."

- " In my opinion the most effective cultural practice on our soil type is underseeding our winter wheat and letting the clover grow the following crop year. However, our financial returns are so low that such a practice is hard to encourage. If farmers weren't generally pressed so closely, better conservation practices might result."

- "As important as conservation is , it must not be forced on farmers without first making sure there will be some immediate increase in farm profits to cover such expenditures and or land loss. With profit margins as low as they are now farmers would be better off to grab what money they can now and let society pay for the lower returns later on when the land has become unsuitable for crop production."

- " The extra cost of many of there ideas is a limiting factor in their incorporation in agricultural practices. Many farmers have difficulty making ends meet to-day, let alone thinking of many years ahead."

5.7 - continued

B) CROP ROTATION:

- "If farmers are going to cash crop every year on the same fields there will be serious problems with erosion and compaction of soil with heavy machinery. We have had this experience. Water on the fields cannot penetrate the soil to the tile drains."

- "Continuous corn cropping should be discouraged in favour of rotation with alfalfa. I have found winter rye can cover corn land for winter to advantage."

- "Develop a market for alfalfa hay or dehydrated alfalfa, to give every cash cropper a chance for rotation."

- "Crop rotation is by far the best way of controlling erosion including alfalfa."

C) CONSERVATION TILLAGE:

- " The use of chisel ploughs, soil savers, etc., has spread rapidly in the last five years. In our part of the township close to half of the land is now 'soil saved'."

- " Alfalfa in a rotation is beneficial. If there was as much alfalfa in London Township as required for good conservation it would be worth 100 per bale! Minimum and reduced tillage programs have never appealed to me because of the reduced effectiveness of incorporated chemicals and the probable increase in disease and insect problems."

D) WATER QUALITY :

- " The way I look at soil erosion is to watch the streams after a big rainfall and see it all brown. It sure tells you something is wrong!"

- " Pollution is caused by pig and cattle farmers dumping liquid manure on top of fields and having it run into the streams."

5.7 - continued

E) EDUCATION:

- "I certainly would like to see literature available to all farmers showing what they can do to help stop erosion on their own and showing the benefits that would come from this practice."

- " Farmers must realize that they are the people who must make use of all available information and ways to protect the soil. Without their support, all other programs, etc. will fail."

- " If you demonstrate good soil conservation, farmers will soon pick up the idea and carry it forward. Windbreaks will be of help as they increase in size, too bad more trees weren't available from the Ministry of Natural Resources."

- " I am sure many farms have problems with soil erosion. Each farmer should be anxious to do what he can to prevent it. Trained advisors should tactfully approach problem areas and work with farmers. Which group?"

- " Soil conservation has to become practised more, but I feel a lot of farmers are becoming more aware of the problem, from factsheets etc."

- " I believe many farmers do not realize that erosion is a problem. There must be an educational program or programs to show the problems to the farmers and also to show that there are economical and profitable solutions."

- " I would like to see some workshops set up for proper surface water inlets into municipal drains. There seems to be a big problem that most overlook. More demonstrations on how proper windbreaks can stop high winds and help crops."

F) WOODLOT REMOVAL/REFORESTRATION:

- " Plant more trees where possible and convenient to improve our low tree population."

5.7 - continued

F) Woodlot Removal/Reforestration - continued

- " The removal of trees and hedges between certain fields should be stopped or at least kept to a minimum for windbreaks."

- "One large problem is the removal of fences and therefore fence rows, so as to grow more and more corn and beans on larger acreage. This leads to erosion by wind, water and machinery. These practices should be stopped. Woodlots are being removed or reduced at alarming rates and should be replanted. Swamps are ditched and drained by municipalities and should be held instead as water reservoirs."

6.0 CONCLUSIONS

1) Soil erosion is not yet perceived as a serious problem by the farming community of the Thames River Basin.

2) Many farmers of the Thames River Basin support the concept of soil conservation being an investment for the future. However, on their individual farms, very few are willing to spend significant amounts of money on soil conservation. Returns are expected to be realized in the short run. Soil conservation is a long term proposition.

3) Capital expense to farmers appears to be a major barrier to acceptance of structural conservation practices. It was observed that of all the farmers interviewed in Survey #1, the individuals who had spent a substantial amount of money on soil conservation had one or both of the following in common:
   A. Installation of practices was subsidized by grants.
   B. Their farm operation was well established and financially secure.

4) Soil conservation is popular and widely accepted in areas of the Thames River Basin where economic damage due to erosion is visible.

5) Farmers of the Thames River Basin are concerned over soil erosionas it relates to farm productivity rather than water quality.

6) Farm newspapers and magazines are the most effective means of relaying general awareness information on soil conservation to the farming community of the Thames River Basin.

7) Highly unacceptable conservation practices in the Thames River Basin are:
   A. Shallow ploughing
   B. Spring ploughing on clay and clay loam soils
   C. Conservation tillage on clay and clay loam soils
   D. Discing as primary tillage rather than moldboard ploughing on heavy soils.

8) The preferred and most acceptable conservation practices in the Thames River Basin are:
   A. Tree windbreaks
   B. Grass buffer strips along watercourses (4 ft. in width)
   C. Re-sloping and seeding drain banks
   D. Field stone used to stop rill and gully erosion
   E. Natural draws in fields left to natural vegetation
   F. Catch basins

9) Sod based crop rotation and conservation tillage have a high potential for widespread farmer acceptability.

10) Farmers of the Thames River Basin are most receptive to the extension efforts of the Ontario Ministry of Agriculture and Food, the Ontario Ministry of Natural Resources and the Conservation Authorities.

Significant reduction in delivery of agricultural sediment to Ontario waterways will be achieved by the widespread adoption of soil conservation techniques by the farm community. The following three points are important factors which determine whether a farmer will implement a conservation practice on his/her farm.

1) He/she must be convinced that his/her land is eroding at a rate that will cause problems in the future in terms of production and everyday operation.

and/or

2) He/she must develop and foster an attitude that capital spent on soil conservation represents an investment in his/her farm's future.

and/or

3) He/she must be able to visualize and be convinced of tangible, direct benefits of specific practices.

Most of the common structural conservation practices are irrelevant to a great majority of farmers. Controlled cattle accesses are only relevant to beef and dairy farmers with either natural or artificial watercourses running through their properties. However, all farmers have two points in common: A) they all till their fields in some fashion or another and B) they all grow crops. Therefore, logic dictates that in terms of effectiveness and potential acceptability, conservation tillage, sod-based crop rotation and strip cropping hold the most promise.

At present, conservation tillage is very popular in some areas of the Thames River Basin where light, sandy soils are predominent. Many farmers located on heavier soils, through both observation and experience, feel that conservation tillage leads to below average yields and a variety of other problems. Once present minimum tillage techniques and implements can be modified to accomodate clay and clay loam soils, conservation tillage will become widely accepted.

The numerous benefits of sod-based crop rotation (ie: higher subsequent yields, reduced insect problems, reduced erosion, etc.) are well documented and accepted by the farming community. Therefore, in theory, sod-based crop rotation is highly acceptable to farmers. However, in practice, market forces make it very difficult for cash crop farmers to include forages in their rotations to economic advantage. Few farmers will grow forages unless they can use the crop themselves or sell it at a profit. Forage production is especially limited in areas where cash cropping is predominant and/or land is highly priced. This situation will likely persist until a reliable marketing system for forages is available to farmers and the profit margins associated with forage production improves. However, if extension workers and researchers are able to convince the majority of farmers of the long term value of sod-based crop rotation, this situation may not be of great significance. Many farmers may be satisfied with breaking even on forage production knowing the benefits outweigh the costs.

7.0 RECOMMENDATIONS

1. Greater research effort should be made in the area of crop rotation and conservation tillage to increase the widespread acceptability of these practices.

2. Practical techniques should be developed to measure and demonstrate the seriousness of types of erosion to the farming community.

3. Farm newspapers and magazines should be used extensively to promote soil conservation and increase farmer awareness of the problem and its implications for the future.

4. Specific soil conservation practices should be promoted on the basis of their direct, tangible benefits (ie: selling points) which farmers can relate to.

5. The greatest promotion effort should be directed towards the highly acceptable conservation practices such as tree windbreaks, natural waterways, buffer strips and conservation tillage on lighter soils.

Ministry of
Agriculture
and Food

November 9,1981
413 Hibernia Street,
Stratford, Ontario,
N5A 5W2

Dear

In a few days Mr. Chris Pharo, Soil Conservation Technician with the Ontario Ministry of Agriculture and Food will be phoning you to ask your help with a survey of the costs and benefits of soil conservation measures.

Chris will be asking you to make a date with him as to when he can come and talk to you about your experience with a grassed waterway on your farm. He has a few questions prepared and they shouldn't take more than a half an hour of your time to answer.

I hope that you will be able to participate in this project. The information you provide will help us to do a better job of advising other farmers on soil conservation measures.

Yours very truly,

NAB/ms

Norman A. Bird, P. Eng.,
Agricultural Engineer.

(Side 1) CONTROLLED LIVESTOCK ACCESS

BENEFITS

(list letters)

		Not Important				Very Important
A	REDUCED BANK DESTRUCTION/EROSION:	0	1	2	3	4
B	REDUCED DRAIN/STREAM MAINTENANCE:	0	1	2	3	4
C	EASIER HERD MANAGEMENT:	0	1	2	3	4
D	AESTHETICS/FARM LOOKS BETTER:	0	1	2	3	4
E	OTHER (specify):	0	1	2	3	4

(side 2) DIRECT COSTS

(list letters)

1. CONSTRUCTION COSTS: A) 0-$300 B) $300-600 C) $600-900
   D) $900-1200 E) More than $1200 F) Don't Know

2. LABOUR (Mandays): A) 1-2 B) 2-4 C) 4-6 D) 6-8
   E) More than 8 F) Don't Know

3. MAINTENANCE (mandays/Yr.): A) 0-2 B) 2-4 C) 4-6 D) 6-8
   E) More than 8 F) Don't Know

4. MACHINERY REQUIRED: Type Hours Used

5. MATERIALS REQUIRED : Type Amount

(Side 1) DRAIN PROTECTION

BENEFITS

(List	letters)	Not Important				Very Important
A	REDUCED BANK EROSION	0	1	2	3	4
B	DRAIN LOOKS BETTER	0	1	2	3	4
C	REDUCED HAZARD TO MACHINERY AND LIFE	0	1	2	3	4
D	REDUCED DRAIN MAINTENANCE COSTS	0	1	2	3	4
E	IMPROVED WATER QUALITY	0	1	2	3	4
F	IMPROVED DRAIN EFFICIENCY	0	1	2	3	4
G	OTHER (specify)	0	1	2	3	4

(Side 2)

INDIRECT COSTS

(List letters)		Not Important				Very Important
A.	LAND WITHDRAWN FROM PRODUCTION	0	1	2	3	4
B.	INCONVENIENCE CAUSED BY SPOIL BANK	0	1	2	3	4
C.	DESTRUCTION OF WILDLIFE HABITAT	0	1	2	3	4
D.	OTHER (specify)	0	1	2	3	4

DIRECT COSTS

1. CONSTRUCTION COSTS: A) 0-$100 B) $100-500 C) $500-1000
   D) $1000-1500 E) More than $1500 F) Don't Know

2. LABOUR (Man/Days): A) 1-2 B) 2-4 C) 2-4 D) 6-8
   E) More than 8 F) Don't Know

3. MAINTENANCE Man/Days/yr): A) 0-2 B) 2-4 C) 4-6 D) 6-8
   E) More than 8 F) Don't Know

		Type	Hours Used
4.	MACHINERY REQUIREMENT		

		Type	Amount
5.	MATERIALS REQUIRED :		

(side 1)

CROP ROTATION

BENEFITS

(list letter)		Not Important				Very Important
A	REDUCED EROSION	0	1	2	3	4
B	BETTER SOIL STRUCTURE	0	1	2	3	4
C	BETTER YIELDS	0	1	2	3	4
D	REDUCED DISEASE PROBLEMS	0	1	2	3	4
E	EASIER WEED CONTROL	0	1	2	3	4
F	REDUCED PESTICIDE COSTS	0	1	2	3	4
G	BETTER DISTRIBUTION OF LABOUR EQUIPMENT USAGE AND RISK	0	1	2	3	4
H	REDUCED ENERGY REQUIREMENTS	0	1	2	3	4
I	SOIL SAVED FOR FUTURE GENERATIONS	0	1	2	3	4
J	REDUCED FERTILIZER COSTS	0	1	2	3	4
K	IMPROVED WATER QUALITY	0	1	2	3	4
L	OTHER (specify)	0	1	2	3	4

(side 2) INDIRECT COSTS

(list letters)		Not Important				Very Important
A	LOW PROFITABILITY	0	1	2	3	4
B	INCOMPATIBLE WITH EXISTING FARM OPERATIONS	0	1	2	3	4
C	GREATER MACHINERY REQUIREMENTS	0	1	2	3	4
D	GREATER LAND BASE REQUIRED	0	1	2	3	4
E	OTHER (specify)	0	1	2	3	4

(Side 1) BUFFER STRIPS

BENEFITS

(list letters)		Important Not				Very Important
A	KEEPS BANK STRUCTURE STABLE/ REDUCES DRAIN MAINTENANCE	0	1	2	3	4
B	REMOVAL OF A HAY CROP FROM BUFFER	0	1	2	3	4
C	IMPROVES WATER QUALITY	0	1	2	3	4
D	IMPROVES WILDLIFE HABITAT	0	1	2	3	4
E	HELPS REDUCE HAZARDS TO MACHINERY	0	1	2	3	4
F	SAVES SOIL FOR FUTURE GENERATIONS	0	1	2	3	4
G	OTHER (specify)	0	1	2	3	4

(side 2)

INDIRECT COSTS

(list letters)		Not Important				Very Important
A	TAKES LAND OUT OF PRODUCTION	0	1	2	3	4
B	NEEDS MOWING	0	1	2	3	4
C	WEED PROBLEMS	0	1	2	3	4
D	OTHER (specify)	0	1	2	3	4

DIRECT COSTS

1. Construction Costs: A) 0-$100 B) $100-200 C) $200-300
   D) $300-400 E) More than $400 F) Don't Know

2. Labour (Mandays): A) 0-1 B) 1-3 C) 3-5 D) 5-7
   E) More than 7 F) Don't Know

3. Maintenance (Mandays/yr.) : A) 0-1 B) 1-3 C) 3-5 D) 5-7
   E) More than 7 D) Don't Know

4. Machinery Requirements:

Type	Hours Used

5. Materials Required:

Type	Amount

(side 1) TREE WINDBREAKS

BENEFITS

(list letters)		Not Important				Very Important
A	REDUCES WIND EROSION	0	1	2	3	4
B	REDUCES HEATING REQUIREMENTS IN FARM BUILDINGS	0	1	2	3	4
C	INCREASED CROP YIELDS	0	1	2	3	4
D	INCREASED CROP QUALITY	0	1	2	3	4
E	MAKES FARM LOOK BETTER	0	1	2	3	4
F	HELPS CONTROL SNOW DRIFTS	0	1	2	3	4
G	SAVES SOIL FOR FUTURE GENERATIONS	0	1	2	3	4
H	OTHER (specify)	0	1	2	3	4

(Side 2) INDIRECT COSTS

(List letters)		Important Not				Very Important
A.	WITHDRAWS LAND FROM PRODUCTION	0	1	2	3	4
B.	TIME NEEDED FOR TREES TO GROW TO BE EFFECTIVE	0	1	2	3	4
C.	MAINTENANCE REQUIRED	0	1	2	3	4
D.	OTHER (specify)	0	1	2	3	4

DIRECT COSTS

1. CONSTRUCTION COSTS : A) 0 - $100 B) $ 100-200 C) $200-300 D) $300-400 E) More than $400 F) Don't Know

2. LABOUR (Mandays): A) 0-1 B) 1-3 C) 3-5 D) 5-6 E) More than 7 F) Don't Know

3. MAINTENANCE (Mandays/yr.): A) 0-1 B) 1-3 C) 3-5 D) 5-7 E) More than 7 F) Don't Know

		Type	Hours Used
4.	MACHINERY REQUIRED :		

		Type	Amount
5.	MATERIALS REQUIRED :		

(Side 1) GRASSED WATERWAY

BENEFITS

(List letters)		Not Important				Very Important
A	REDUCES RILL EROSION	0	1	2	3	4
B	REMOVAL OF A HAY CROP	0	1	2	3	4
C	REDUCTION IN HAZARDS TO MACHINERY	0	1	2	3	4
D	IMPROVED WATER QUALITY	0	1	2	3	4
E	SOIL SAVED FOR FUTURE GENERATIONS	0	1	2	3	4
F	FIELD LOOKS BETTER	0	1	2	3	4
G	INCREASED FARM INCOME	0	1	2	3	4
H	PROTECTION OF TILES	0	1	2	3	4
I	OTHER (specify)	0	1	2	3	4

(Side 2)

INDIRECT COSTS

(List letters)		Not Important				Very Important
A	LAND TAKEN OUT OF PRODUCTION	0	1	2	3	4
B	INCONVENIENCE FARMING FIELD	0	1	2	3	4
C	MOWING	0	1	2	3	4
D	WEED CONTROL	0	1	2	3	4
E	OTHER (specify)	0	1	2	3	4

DIRECT COSTS

1. CONSTRUCTION COSTS: A) 0-$100 B) $100-500 C) $500-1000
   D) $1000-1500 E) More than $1500 F) Don't Know

2. LABOUR (Mandays): A) 1-2 B) 2-4 C) 4-6 D) 6-8
   E) More than 8 F) Don't Know

3. MAINTENANCE (Mandays/yr.): A) 0-2 B) 2-4 C) 4-6 D) 6-8
   E) More than 8 F) Don't Know

		Type	Hours Used
4.	MACHINERY REQUIREMENT:		

		Type	Amount
5.	MATERIALS REQUIRED :		

(Side 1) CONSERVATION TILLAGE

BENEFITS

(List Letters)		Not Important				Very Important
A	REDUCED WATER EROSION	0	1	2	3	4
B	REDUCED WIND EROSION	0	1	2	3	4
C	REDUCED ENERGY REQUIREMENTS	0	1	2	3	4
D	IMPROVED SOIL STRUCTURE	0	1	2	3	4
E	TIME SAVED	0	1	2	3	4
F	SOIL SAVED FOR FUTURE GENERATIONS	0	1	2	3	4
G	IMPROVED WATER QUALITY	0	1	2	3	4
H	OTHER (specify)	0	1	2	3	4

(Side 2) INDIRECT COSTS

(List letters)		Not Important				Very Important
A	DECREASED YIELDS	0	1	2	3	4
B	SPECIAL EQUIPMENT REQUIREMENTS	0	1	2	3	4
C	OTHER (specify)	0	1	2	3	4

Type

4. MACHINERY REQUIRED:

EXISTING SOIL EROSION CONTROL PRACTICE SURVEY

Appendix # 3
Survey # 1

PRACTICE:
TOWNSHIP:
RATING: Good Fair Poor

1) INDIRECT COSTS/BENEFITS (reaction card)

Benefits						Costs					
A	0	1	2	3	4	A	0	1	2	3	4
B	0	1	2	3	4	B	0	1	2	3	4
C	0	1	2	3	3	C	0	1	2	3	4
D	0	1	2	3	4	D	0	1	2	3	4
E	0	1	2	3	4	E	0	1	2	3	4
F	0	1	2	3	4	F	0	1	2	3	4
G	0	1	2	3	4	G	0	1	2	3	4
H	0	1	2	3	4	H	0	1	2	3	4
I	0	1	2	3	4	I	0	1	2	3	4
J	0	1	2	3	4	J	0	1	2	3	4
K	0	1	2	3	4	K	0	1	2	3	4
L	0	1	2	3	4	L	0	1	2	3	4

2) DIRECT COSTS

1. CONSTRUCTION COSTS A B C D E F
2. LABOUR (man-days) A B C D E F
3. MAINTENANCE (man-days/yr.) A B C D E F

	Type	Hours
4. MACHINERY REQUIREMENT		

	Type	Amount
5. MATERIALS REQUIRED		

3) TECHNICAL ASSISTANCE

a) Did you receive technical assistance in planning, designing, and construction of your soil erosion control measure?

YES NO

If Yes, from whom?

Was assistance adequate? Yes No Don't Know

If no, why not?

b) What are the best sources of information to you personally concerning soil conservation?

i) Field staff ii) Factsheets iii) Farm newspapers/magazines
iv) Demonstration days v) Other (specify) vi) Don't know

4) FINANCIAL ASSISTANCE

a) Did you happen to receive assistance? Yes No

If yes, would you have implemented your measure without financial assistance or subsidization?

YES NO

5) CONSTRUCTION

a) Did you experience problems during the construction phase?

YES NO

If yes, describe.

b) Did you have problems with equipment availability?

YES NO DON'T KNOW

If yes, specify.

c) Is timing important with this type of project?

YES NO DON'T KNOW

If yes, specify.

d) Was there damage to your property during construction?

YES NO DON'T KNOW

If yes, describe damage.

6) PERFORMANCE

a) Has this soil erosion problem been reduced?

YES NO DON'T KNOW

If yes, major minor

b) Would you try another alternative?

YES NO DON'T KNOW

If yes, specify.

c) Do you have any general improvements to your design to suggest?

YES NO DON'T KNOW

If yes, specify

d) Who do you feel should take the leading role in the area of soil conservation?

a) O.M.A.F. b) O.M.N.R. c) O.M.O.E.

d) Conservation Authorities e) Federal Government

f) Other

TILLAGE PRACTICES SURVEY

1. Identification of present tillage practices:

NOTE: this question must be filled out separately for each different crop.

Crop: _____

Soil Type:
- Gravelly, course sand _____
- Sandy loam _____
- Loam, silt loam _____
- Clay loam, clay _____

Drainage:
- Natural _____
- Tiled _____

Excellent _____
Good _____
Poor _____

Primary Tillage:

Machine		Timing	
Moldboard plough without trashboards	_____	Fall	_____
Chisel plough	_____	Spring	_____
Mulch tiller	_____	Offset disc	_____
Heavy tandem disc	_____		
Other (specify)	_____		

Primary Tillage - Continued:

Number of Passes	Depth	Direction
1 _____	≤ 8"	Across slope or on contour _____
>1 _____	≥ 8"	Up and down slope _____

Secondary Tillage:

Machine	Number of Passes	Depth
Cultivator _____	1 _____	<= 4" _____
Tandem disc-harrows _____	2 _____	>4" _____
Cultipacker _____	3 _____	
Harrows _____	>3 _____	

Other (specify) _____

Mechanical Weed Control:

Machine	Number of Passes
Cultivator _____	1 _____
Rotary Hoe _____	>1 _____

Other (specify) _____

2. Number of years the above system has been used:

≤3 _____
>3 _____

3. What were your tillage practices before?

4. What influenced you to change tillage practices?

News media _____ Neighbour _____

Machinery Dealer _____ Research information _____

Government Extension Personnel _____ Demonstration _____

Other (specify) _____

5. What problems did you have in making the change?

e.g. Technical assistance
Machinery operation

6. Specific information about present tillage practices in comparison to your previous tillage practices:

	Yes	No
▸ Are you satisfied with the way the soil works up?	____	____
▸ Have you had any extra problems planting in heavier residue?	____	____
▸ Do you have extra problems with weed control?	____	____
▸ Have you extra problems with insects?	____	____

If yes, specify _____

6. - continued

- How do you apply your fertilizer?

  Broadcast ____ Fall ____ Spring ____

  Starter ____

  Nitrogen When _____
  Type _____

  Manure ____

- Are your yields:

		% of change (if available)
- significantly less	_____	_____
- about the same	_____	_____
- significantly more	_____	_____

- Do you fell you have saved a significant amount of:

	Yes	No
- Soil	____	____
- Labour	____	____
- Fuel	____	____

Appendix 5
SURVEY # 2

POTENTIAL/EXISTING EROSION PROBLEM SITE

1. NATURE OF PROBLEM: Gully _____

Rill _____

Sheet _____

Stream/Ditch Bank _____

Wind _____

Livestock Access _____

2. TOWNSHIP: _____

3. HAS THE PROBLEM BEEN RECOGNIZED? Yes No

4. IF YES, NO REMEDIAL MEASURE IN PLACE BECAUSE:

a) Problem not severe enough _____

b) Insufficient Technical Assistance _____
i) What type do you need? _____
_____

c) Financial Constraint _____
i) How much assistance do you feel is fair or sufficient?
(% Total Cost) _____

d) Physical Constraint _____
i) Land withdrawn from production _____
ii) Reduction in yields _____
iii) Soil not suitable _____
iv) Necessary machinery not available.
_____

v) Other/Specify - _____
_____

SOIL CONSERVATION QUESTIONNAIRE APPENDIX 6

1. In general would you say soil erosion is affecting farm productivity in your township?

(circle one)

Yes No I don't know

2. Would you say soil erosion in your township is a major contributor to water pollution?

(circle one)

Yes No I don't know

3. From which of the following do you receive the largest portion of your farm income?

(check one)

Dairy ____ Beef ____ Swine ____ Poultry ____

Cash Crop ____ Specialty (i.e. tobacco) ____ Other ____

4. Which one of the following soil types would best describe the majority of the land you farm?

(check one)

Sand ____ Sandy Loam ____ Clay Loam ____ Clay ____

5. How would you rate soil erosion control as a priority on your farm?

(circle one)

High Medium Low

6. Which of the following types of soil erosion do you feel are serious problems in your township? Please indicate the seriousness of each by 1) for extremely serious, 2) for very serious, 3) minor, etc.:

a) Gully _____

b) Sheet(field) _____

c) Wind _____

d) Ditch Bank _____

7) How would you rate the following soil conservation soil conservation practices for effectiveness in solving different types of soil erosion and acceptability to you as a farmer? For each of the practices listed, Check, (✔) either A, B, C, or D.

GULLY EROSION

	(A) Effective & Acceptable	(B) Effective But Not Acceptable	(C) Not Effective	(D) Not Familiar With Practice,
1. Grassed waterways designed and constructed by experts (shaped, tiled, seeded to grass)				
2. Natural waterways left as is and seeded to grass				
3. Natural waterways planted to crops and left unploughed				
4. Catch Basins				
5. Others (?)				

WIND EROSION

	(A) Effective & Acceptable	(B) Effective But Not Acceptable	(C) Not Effective	(D) Not Familiar With Practice
1 Tree Windbreaks				
2 Chisel plough to keep trash on surface				
3 Mulch tiller (i.e. chisel plough with discs on the front				
4 Disc rather than moldboard plough				
5 All ploughing left until spring				
6 Others (?)				

DITCHBANK EROSION

	(A) Effective & Acceptable	(B) Effective but Not Acceptable	(C) Not Effective	(D) Not Familiar With Practice
1 Grass Buffer Strips along drain at least four feet in width				
2 Drop Inlets				
3 Banks re-sloped and seeded				

SHEET (FIELD) EROSION

	(A) Effective & Acceptable	(B) Effective but Not Acceptable	(C) Not Effective	(D) Not Familiar With Practice
1 Sod-based crop rotations(i.e. alfalfa)				
2 Chisel plough to keep trash on surface				
3 Mulch tiller(i.e. chisel plough with discs on the front)				
4 Moldboard plough without trash covers.				
5 Ploughing across slopes				
6 Shallow ploughing				
7 All ploughing left until spring				
8 Winter cover crop				
9 Others (?)				

DITCHBANK EROSION(continued)

	(A) Effective & Acceptable	(B) Effective But Not Acceptable	(C) Not Acceptable	(D) Not Familiar With Practice
4 Field stone piled in cuts along drain or ditchbank				
5 Sacked Concrete				
6 Gabion baskets (wire baskets filled with stone.				
7 Fencing livestock out of streams and ditches				
8 Others (?)				

8. What is the BEST source of information to you personally concerning soil conservation? (please check one)

   i) Field staff ii) Factsheets iii) Farm newspapers/magazines
   iv) Demonstration days v) Other (specify) vi) Don't know

9. Who should take the LEADING ROLE in the area of soil conservation? (check one)

   i) Ontario Ministry of Agriculture and Food _____

   ii) Ontario Ministry of Natural Resources _____

   iii) Ontario Ministry of the Environment _____

   iv) Conservation Authority _____

   v) Federal Government _____

   vi) Other (specify) _____

   vii) Don't Know _____

10) Thank you for completing this questionnaire.

Do you have any further comments on soil erosion in your area? (i.e. suggestions, solutions, etc.)

_____

_____

_____

_____

_____

_____

Appendix 7

Ministry of
Agriculture
and Food

November 4,1981

413 Hibernia Street,
Stratford, Ontario,
N5A 5W2

WE NEED YOUR HELP!

The Ontario Ministry of Agriculture and Food and Agriculture Canada are conducting a farmer opinion study on soil conservation. We want to find out how farmers feel about soil erosion and the acceptability of specific soil conservation practices. We are interested in your thoughts. Information you provide us with will be used to help field staff do a better job recommending to farmers effective and acceptable solutions to soil erosion problems.

In order to get a good cross-section of farmers in the study area, we picked a number of names by chance from the July, 1981 Farm Tax Reduction program list. Your name was chosen in this way.

Enclosed is a questionnaire and a stamped, self-addressed envelope. We are asking you to take a few minutes to fill out the form to the best of your ability and return it in the envelope provided. Completed questionnaires will be kept confidential, No names will be used in any report.

Your participation in this project is very important. Therefore, we would appreciate your co-operation.

Yours very truly,

Encl:
CP/ms

Chris Pharo,
Soil Conservation Technician

Appendix 8

Ministry of
Agriculture
and Food

December 4,1981

413 Hibernia Street,
Stratford, Ontario,
N5A 5W2

Dear

As you may recall, you received a questionnaire in the mail recently. The questionnaire deals with the acceptability and effectiveness of soil conservation practices. The information you provide us with will be used by field staff involved with soil erosion problems. I am very interested in your opinions but I have yet to receive your reply. Would it be possible to have the form filled out and returned by December 15th 1981?

I am thanking you in advance for your co-operation. If your questionnaire is in the mail, please disregard this letter.

Yours truly,

CP/ms

Chris Pharo,
Soil Conservation Technician