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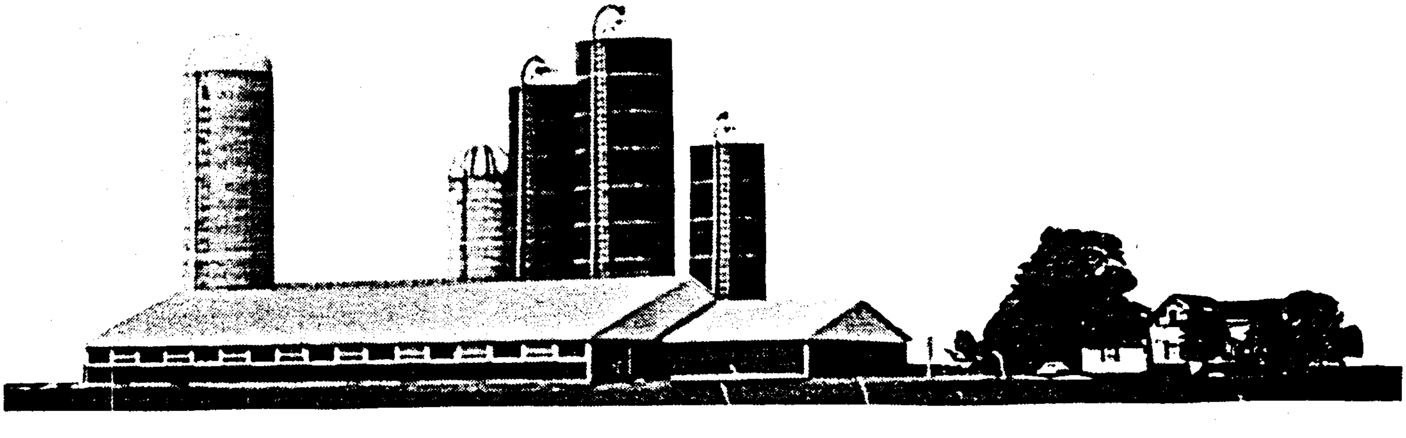
Eastern Ontario Subsidiary Agreement

SOUTH NATION RIVER BASIN DEVELOPMENT STUDY

Report No. 4

Agricultural Component



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August 19, 1981

Mr. M.R. Garrett
General Manager
South Nation River Conservation Authority
P.O. Box 118
Berwick, Ontario
K0C 1G0

Re: Report No. 4
Agricultural Component Background Study

Dear Mr. Garrett:

We are pleased to submit fifty (50) copies of the Agricultural Component Study final report, and fifty (50) copies of the Executive Summary in English and French.

This report describes the agricultural industry in the South Nation River Basin and examines the potential for future development. The future looks very promising. A major factor in this regard is agricultural drainage, which is essential if farmers are to share in the economic opportunities now and in the future.

We want to thank the staff of the Authority, farmers, Ontario Ministry of Agriculture and Food, Kemptville College of Agricultural Technology, Agriculture Canada, and the members of the food industry and agribusiness that cooperated so willingly and assisted us throughout this important project.

Yours truly,

William W. Graham

William W. Graham, P.Ag.
Study Coordinator

WG/ch

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AGRICULTURAL COMPONENT BACKGROUND STUDY

PART I

Prepared for the South Nation River
Conservation Authority, Berwick, Ontario

July , 1981

Prepared by Weston Graham & Associates Ltd.
in co-operation with
InfoResults Ltd. and
Robinson, Merritt and deVries Ltd.

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EXECUTIVE SUMMARY

SOMMAIRE À L'INTENTION DES DÉCISIONNAIRES

Agricultural Component Background Study
for the
South Nation River Basin

Étude fondamentale des composantes agricoles
du bassin de la
rivière Nation sud

L'AGRICULTURE DANS LE BASSIN DE LA RIVIÈRE NATION SUD

La présente étude fondamentale des composantes agricoles a été menée dans le but de définir les assises agricoles pour les deux raisons suivantes:

- identifier les possibilités et les contraintes du développement agricole du bassin;
- fournir des renseignements de type agricole à la planification des ressources hydrauliques du bassin.

Le bassin de la rivière Nation sud est une des régions agricoles les plus productives de l'est de l'Ontario. C'est une région aux exploitations variées où la production laitière tient les devants. Les cultures commerciales y prennent de plus en plus d'importance en particulier pour le maïs-grain. De nombreuses réussites agricoles proviennent de la combinaison de plusieurs entreprises ou d'"alliances de profit" qui se complémentent l'une l'autre en terme de gestion, de travaux et de capitaux. C'est le cas des fermes laitières et des cultures commerciales ou encore des élevages de boeufs, de porcs et des cultures maraîchères.

Ce sont les industries de transformation et de fabrication du bassin et des territoires environnants qui revêtent l'envergure et l'importance de l'agriculture. Le secteur des aliments et boissons domine avec 81 entreprises. En 1976, celui-ci totalisait quelques 504 000 000$ de produits. La croissance continue.

CADRE SOCIO-ÉCONOMIQUE

Le cadre socio-économique du bassin, ses tendances récentes de croissance de la population et sa structure rurale-urbaine sont examinés selon les activités des entreprises de transformation et des manufactures; selon la production agricole; selon les valeurs et les revenus aussi bien que selon la structure agricole. La majeure partie des données ne sont disponibles qu'aux paliers de la municipalité ou du comté, sauf pour ce qui est de l'analyse de la structure agricole qui ne s'appliquent presqu'exclusivement, aux exploitations agricoles du bassin.

Population: La population des municipalités du bassin a augmenté de façon substantielle entre 1961 et 1976, passant de 130 500 à 190 200. Le plus important facteur de croissance est la population rurale

THE AGRICULTURAL INDUSTRY IN THE BASIN

The Agricultural Component Background Study was initiated to describe the agricultural base for two main reasons:

- to identify the opportunities and constraints for agricultural development in the Basin;
- to provide agricultural development information for water resource management planning in the Basin.

The South Nation River Basin is one of the most highly productive agricultural areas in Eastern Ontario. It is a mixed farming area with dairy being the major form of enterprise. Cash crops are rapidly gaining in importance, especially grain corn. Many successful farm operations are a combination of several enterprises or "profit centers" that compliment each other in terms of management, labour and capital - such as dairy and cash crops, or beef, hogs, and horticultural crops.

The strength and importance of agriculture is reflected in the processing and manufacturing activities that are carried on in the Basin and surrounding areas. The food and beverage sector is the dominant group with 81 establishments, and a total product value of $504 million in 1976. The trend appears to be one of continuing growth.

SOCIO-ECONOMIC FRAMEWORK

The socio-economic framework of the South Nation River Basin is examined in terms of the recent patterns of population growth and its rural/urban structure, processing and manufacturing activities, farm production, value and income, as well as farm structure. Most of the data is available only at the township and county level, except farm structure analysis, which applies almost exclusively to farms in the Basin area.

Population: The number of people living in the Basin area townships increased substantially from 130,500 in 1961 to 190,200 in 1976. The major growth component has been the rural non-farm population. Farm population has declined from 38,500 in 1961 non-agricole. La population agricole a diminué de 38 500 en 1961 à 17 600 en 1976. On s'attend à ce que cette diminution se prolonge bien qu'à un taux plus faible que dans le passé.

Revenu agricole: La moyenne du revenu agricole total des huit comtés du bassin était considérablement inférieure à la moyenne de l'Ontario qui se situe à 7462$ pour la période 1967-1977. Toutefois dans quatre des huit comtés, le revenu agricole net était supérieur à la moyenne de la province qui est de 1845$. Dans les comtés de Dundas, Glengarry, Prescott et Russell les revenus agricoles nets se situaient aux environs de 2147$, 2175$, 2357$ et 2294$ respectivement pour la même période de 11 ans. Les revenus autres qu'agricoles, étaient plus élevés dans les comtés unis de Ottawa-Carleton que partout ailleurs dans la province alors que les revenus agricoles nets étaient plus faibles dans ces comtés unis que dans les autres sept comtés.

Structure agricole: L'analyse de la structure agricole s'appuie sur une compilation spéciale des données des recensements agricoles de 1971 et 1976, effectués par Statistiques Canada dans le bassin de la rivière Nation sud.

En 1971 il y avait dans la région 3008 fermes dont les ventes s'élevaient à 2500$ ou plus. Les quatre-cinquièmes de celles-ci étaient des exploitations laitières. Le nombre total a diminué de 8,3% pour se situer à 2747 fermes, dont les deux-tiers sont des exploitations laitières. Le nombre d'exploitations laitières a diminué au cours de la même période de 23% alors que le nombre d'exploitations d'élevage de boeuf, de porc et autre augmentait de 389 à 505 (environ 30%). Les élevages de volaille diminuaient de 87 à 63 durant la même période.

Les exploitations de cultures commerciales se sont augmentées de façon radicale en passant de 70 à 200 et celles dont le principal revenu provient de la vente des fruits et des légumes sont passées de 35 à 51.

La superficie des exploitations a augmenté. Le pourcentage des exploitations de 240 acres ou plus (97 ha) est passé de 26% environ du total en 1961 à plus de 31% du total en 1976. Les investissements en capital se sont également augmentés de façon substantielle entre 1971 et 1976. En 1971, environ 11% des fermes avaient un investissement en capital de plus de 100 000$. En 1976, environ 63% des exploitations avaient investi des sommes supérieures.

to 17,600 in 1976 and this downward trend is expected to continue but at a slower rate than in the past.

Farm Income: Average total farm income in the eight counties of which the Basin is a part, was considerably below the Ontario average of $7,462 over the 1967-77 period. However, net farm income was higher than the provincial average of $1,845 in four of the eight counties. In Dundas, Glengarry, Prescott and Russell net farm incomes averaged $2,147, $2,175, $2,357 and $2,294 respectively over the eleven year period. Off-farm income was higher in Ottawa/Carleton than for the Province, but net farm income was lower in this area than the other seven counties.

Farm Structure: Farm structure analysis was based on a special compilation of 1971 and 1976 Census of Agriculture by Statistics Canada for the South Nation River Basin.

In 1971 there were 3,008 farms with sales of $2,500 or more in the area, and four-fifths of them were dairy farms. The total number decreased by 8.3% to 2,747 farms - of which two-thirds were dairy enterprises. The number of dairy farms decreased by 23% over that period, while the number of cattle, hog and livestock enterprises increased from 389 to 505 (about 30%). Poultry farms decreased from 87 to 63 over the 1971-76 period.

Field crop enterprises increased sharply from 70 to 200 farms, and those whose main source of income was from fruit and vegetables increased from 35 to 51 farms.

Farm size has been increasing. The percentage of farms that were 240 acres or more increased from about 26% of the total in 1961, to more than 31% in 1976. Capital investment also increased substantially between 1971 and 1976. In 1971, about 11% of the farms had a capital investment of more than $100,000. By 1976, about 63% of the farms had more than that invested.

RESSOURCES AGRICOLES FONDAMENTALES

Le sol, le climat, la capacité agricole des sols, l'utilisation des terres, le drainage et l'environnement agricole du bassin ont été examinés afin de déterminer les caractéristiques quantitatives et qualitatives des ressources agricoles de base. Bien que ces ressources soient très productives, les conditions climatologiques de la région ne donnent guère plus de 60% du temps disponible pour les travaux des champs par rapport aux fermiers du sud de l'Ontario.

Bases physiques de l'agriculture

Le bassin possède une grande variété de sols et de conditions de sol qui se présentent de façon complexe et enchevêtrée. Ces dispositions déterminent la capacité agricole et l'utilisation des terres du bassin. Les sols vont des sables légers, acides aux sols gras fangeux. Il y a des parties d'argile et de loams argileux très productives ici et là. Une grande partie de ces sols conviennent à la production agricole.

La température moyenne annuelle dans la région est de 6°C, ce qui est 3°C de moins que dans les comtés Kent-Essex. La période sans gelée est de 140 jours dans la partie sud du bassin et de 130 jours dans celle du nord. La période de croissance va de 190 jours dans le nord à 200 jours dans le sud. Les unités de chaleur pour le maïs vont de 2500 à 2700.

Près de 78% de la superficie du bassin, soit quelques 750 000 acres (303 000 ha), sont des sols de capacités agricoles de classe 1 à 4. Le tableau 2.4 du texte indique la répartition des classes et sous-classes par municipalité.

Utilisation des terres dans le bassin

Le nouveau système provincial de tracé cartographique de l'utilisation des terres (appelé en anglais FARINEO) a été utilisé pour déterminer les superficies de chaque type d'utilisation des terres par municipalité. Le tableau 3.3 du texte fait le résumé de ces usages.

Drainage agricole dans le bassin

La direction du développement des terres agricoles (en anglais Foodland Development Branch) du ministère de l'agriculture et de l'alimentation de l'Ontario a mené en 1980, une étude du drainage. Les résultats préliminaires indiquent qu'il y a un peu plus de 78 000 acres (31 512 ha) ou 8,1% des terres, qui bénéficient de drains souterrains. Ceci représente 13,3% des terres à vocation agricole. Là où on cultive le maïs de façon intensive, le pourcentage de terres drainées s'élève à 30 et 35%.

AGRICULTURAL RESOURCE BASE

Soils, climate, agricultural soils capability, land use, drainage and the agricultural environment were examined in the Basin to determine the quantitative and qualitative characteristics of the agricultural resource base. While this resource base is a very productive one, area weather patterns only give farmers about 60% of the working time on the land, compared with farmers in Southern Ontario.

The Physical Base for Agriculture

The Basin has a wide variety of soils and soil conditions that occur in complex and intermixed patterns. These patterns control the agricultural capability and land use in the Basin. The soils range from light, acid sands to muck soils, with large areas of highly productive clays and clay loams. A high proportion of these soils are suitable for agricultural production.

The mean annual temperature in the region is 6^{0}C, which is 3^{0}C cooler than the Kent-Essex area. The frost-free period is 140 days in the south part of the Basin and 130 days in the north part. The growing periods range from 190 days in the north to about 200 days in the south. Corn heat units range from 2,500 to 2,700 in the Basin.

Nearly 78% of the Basin area or 750,000 acres are in agricultural soils capability classes 1-4. Table 2.4 from the text shows the distribution of classes and sub-classes by township.

Land Use in The Basin

The new provincial land use mapping system (FARINEO) was used to determine acreages of each type of land use, by township. Table 3.3 from the text summarizes these uses.

Land Drainage in the Basin

The Foodlands Development Branch, OMAF carried out a drainage survey in 1980. Preliminary results indicate that just over 78,000 acres or 8.1% of the Basin land area are tile drained. This represents 13.3% of the land used for agriculture. In areas where corn is grown extensively, the percentage of tile drained land rises to 30-35%.

Tableau 2.4: Bassin de la rivière Nation sud

Capacité agricole des sols, superficie (ac) et résumé[1] des municipalités situées dans le bassin

Classes et sous-classes[1]	Gloucester	Osgoode	Cumberland	Russell	Clarence	Cambridge	Nord Plantagenet	Sud Plantagenet	Alfred	Caledonia	Ouest Hawkesbury	Elizabethtown	Oxford	Augusta	Edwardsburg	South Gower	Mountain	Winchester	Matilda	Williamsburg	Finch	Osnabruck	Roxborough	Kenyon	Lochiel	Total
													acres													
1	1320	18253	2413	4348	226	562	-	-	-	397	126	19	3761	3761	7149	3354	11573	11474	6913	1220	5811	834	1457	4054	-	89025
2w	807	7290	20	11345	872	14811	119	1672	279	3169	46	-	577	2644	1522	738	14681	18391	21608	7394	22702	383	7820	257	-	139147
2p	893	326	-	-	-	-	-	-	-	-	-	-	-	56	-	-	-	-	-	-	-	-	-	-	-	1275
2d	-	-	3793	-	2719	173	3712	3452	-	208	-	-	-	-	-	-	-	4690	579	2168	4229	1337	4022	171	-	31253
2t	6413	8850	1945	18824	2649	12594	-	2861	-	1325	-	-	-	-	-	301	-	-	-	-	-	-	-	-	-	55762
2fm	-	99	-	-	-	-	-	592	-	-	-	-	-	830	1126	-	792	-	143	-	154	-	-	-	-	3736
2fw	-	-	-	-	-	1035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1035
Subtotal	8113	16565	5758	30169	6240	28613	3831	8577	279	4702	46	-	577	3530	2648	1039	15473	23081	22330	9562	27085	1720	11842	428	-	232208
3f	104	27	1992	1134	1806	272	-	70	-	-	-	353	653	4601	16273	1321	6724	140	8516	-	3235	448	5747	2483	-	55899
3w	1390	4538	20207	4763	12865	863	11590	20716	6326	10930	124	-	-	5557	1145	116	1401	7181	2219	1473	2197	678	1730	6853	386	125248
3s	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-	-	-	-	-	-	-	-	-	-	-	63
3d	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	141	3804	4482	6642	5938	2007	4032	-	-	27046
3r	-	-	-	-	-	-	-	-	-	-	-	-	109	3915	1788	-	-	48	-	-	334	132	177	2020	-	8523
3p	584	7249	2733	1975	359	40	-	-	-	1571	295	-	1787	1847	4599	1601	3857	6004	1421	555	3372	1252	2774	8190	-	52065
3l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	394	-	-	-	-	-	-	-	-	419
3fm	-	-	-	-	-	-	-	-	-	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73
Subtotal	2078	11814	24932	7872	15030	1175	11590	20786	6326	12574	419	353	2549	15983	23805	3063	12517	17177	16638	8670	15076	4517	14460	19546	386	269336
4w	-	-	-	-	-	-	-	-	273	-	105	150	-	522	358	-	-	338	779	1684	55	252	1168	92	-	5776
4f	3840	3669	-	-	150	-	11502	5204	273	694	-	-	-	-	-	196	-	-	-	-	-	-	-	-	-	25528
4s	-	957	32	-	69	-	-	999	-	2551	-	-	-	233	-	-	-	-	-	-	-	-	38	-	-	4879
4r	-	6157	6	-	-	-	-	-	-	-	-	69	-	-	82	-	-	-	-	-	-	-	-	-	-	6314
4fm	6545	1184	6167	851	5481	3118	9535	4990	1811	2109	-	593	1029	4493	4681	726	2548	921	848	-	1691	1291	11215	1795	161	73783
4ws	-	-	8745	4475	10218	12408	813	4787	1200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42646
Subtotal	10385	11967	14950	5326	15918	15526	21850	15980	3557	5354	105	812	1029	5248	5121	922	2548	1259	1627	1684	1746	1543	12421	1887	161	158926
5w	227	7807	-	-	1413	-	-	-	-	158	151	675	1706	4669	14643	1684	12755	5147	3236	1162	1813	796	5540	1220	51	64853
5t	-	-	-	-	-	-	-	-	-	-	-	-	-	767	1170	-	-	-	-	-	-	-	-	-	-	1937
5p	-	-	-	-	-	-	-	-	-	73	-	-	728	-	94	-	-	-	-	23	-	-	-	-	-	918
5sw	-	-	-	-	8054	14162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22216
5fm	-	-	-	-	-	-	-	-	-	-	-	139	-	-	-	-	-	-	-	-	-	-	-	-	-	139
Subtotal	227	7807	-	-	9467	14162	-	-	-	231	151	814	2434	5436	15907	1684	12755	5147	3236	1185	1813	796	5540	1220	51	90063
6w	-	-	-	-	-	-	-	-	-	-	-	-	-	82	-	-	-	-	106	-	-	-	-	-	-	188
6p	997	2974	410	263	392	1821	-	-	-	-	-	-	-	12	150	-	-	116	-	-	1688	-	-	526	-	9349
6r	1119	2444	1437	25	257	46	1172	142	-	-	-	25	537	6677	2046	19	-	66	-	-	91	30	174	-	-	16307
6wp	-	-	-	-	-	851	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	851
6wl	-	-	-	971	819	-	2772	1798	-	829	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7189
Subtotal	2116	5418	1847	1259	1468	2718	3944	1940	-	829	-	25	537	6771	2196	19	-	182	106	-	1779	30	174	526	-	33884
7p	-	-	-	-	-	-	-	-	-	275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275
O	3966	9556	1475	331	1476	3426	825	3464	4148	12728	283	302	2493	7086	7904	1919	6174	4325	1490	2124	230	2185	10801	2489	122	91322
Eau	-	-	-	-	-	253	535	548	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1361
Total	28205	81380	51375	49305	49825	66435	42575	51295	14335	37090	1130	2325	13380	47815	64730	12000	61040	62645	52340	24445	53540	11625	56695	30150	720	966400

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[1] Les superficies des *unités de capacité complexe* ont été calculées au pourcentage du bassin et comprises dans les catégories de sous-classes.

Table 2.4: South Nation River Basin

Agricultural Land Capability, Acreage and Summary[1] For The Areas of Township Which Lie Within The Basin

Land Class & Subclass	Gloucester	Osgoode	Cumberland	Russell	Clarence	Cambridge	North Plantagenet	South Plantagenet	Alfred	Caledonia	West Hawkesbury	Elizabethtown	Oxford	Augusta	Edwardsburg	South Gower	Mountain	Winchester	Matilda	Williamsburg	Finch	Osnabruck	Roxborough	Kenyon	Lochiel	Total
													acres													
1	1320	18253	2413	4348	226	562	-	-	-	397	126	19	3761	3761	7149	3354	11573	11474	6913	1220	5811	834	1457	4054	-	89025
2w	807	7290	20	11345	872	14811	119	1672	279	3169	46	-	577	2644	1522	738	14681	18391	21608	7394	22702	383	7820	257	-	139147
2p	893	326	-	-	-	-	-	-	-	-	-	-	-	56	-	-	-	-	-	-	-	-	-	-	-	1275
2d	-	-	3793	-	2719	173	3712	3452	-	208	-	-	-	-	-	-	-	4690	579	2168	4229	1337	4022	171	-	31253
2f	6413	8850	1945	18824	2649	12594	-	2861	-	1325	-	-	-	-	-	301	-	-	-	-	-	-	-	-	-	55762
2fm	-	99	-	-	-	-	-	592	-	-	-	-	-	830	1126	-	792	-	143	-	154	-	-	-	-	3736
2fw	-	-	-	-	-	1035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1035
Subtotal	8113	16565	5758	30169	6240	28613	3831	8577	279	4702	46	-	577	3530	2648	1039	15473	23081	22330	9562	27085	1720	11842	428	-	232208
3f	104	27	1992	1134	1806	272	-	70	-	-	-	353	653	4601	16273	1321	6724	140	8516	-	3235	448	5747	2483	-	55899
3w	1390	4538	20207	4763	12865	863	11590	20716	6326	10930	124	-	-	3557	1145	116	1401	7181	2219	1473	2197	678	1730	6853	386	125248
3s	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-	-	-	-	-	-	-	-	-	-	-	63
3d	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	141	3804	4482	6642	5938	2007	4032	-	-	27046
3r	-	-	-	-	-	-	-	-	-	-	-	-	109	3915	1788	-	-	48	-	-	334	132	177	2020	-	8523
3p	584	7249	2733	1975	359	40	-	-	-	1571	295	-	1787	1847	4599	1601	3857	6004	1421	555	3372	1252	2774	8190	-	52065
3l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	394	-	-	-	-	-	-	-	-	419
3fm	-	-	-	-	-	-	-	-	-	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73
Subtotal	2078	11814	24932	7872	15030	1175	11590	20786	6326	12574	419	353	2549	15983	23805	3063	12517	17177	16638	8670	15076	4517	14460	19546	386	269336
4w	-	-	-	-	-	-	-	-	273	-	105	150	-	522	358	-	-	338	779	1684	55	252	1168	92	-	5776
4f	3840	3669	-	-	150	-	11502	5204	273	694	-	-	-	-	-	196	-	-	-	-	-	-	-	-	-	25528
4s	-	957	32	-	69	-	-	999	-	2551	-	-	-	233	-	-	-	-	-	-	-	-	38	-	-	4879
4r	-	6157	6	-	-	-	-	-	-	-	-	69	-	-	82	-	-	-	-	-	-	-	-	-	-	6314
4fm	6545	1184	6167	851	5481	3118	9535	4990	1811	2109	-	593	1029	4493	4681	726	2548	921	848	-	1691	1291	11215	1795	161	73783
4wa	-	-	8745	4475	10218	12408	813	4787	1200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42646
Subtotal	10385	11967	14950	5326	15918	15526	21850	15980	3557	5354	105	812	1029	5248	5121	922	2548	1259	1627	1684	1746	1543	12421	1887	161	158926
5w	227	7807	-	-	1413	-	-	-	-	158	151	675	1706	4669	14643	1684	12755	5147	3236	1162	1813	796	5540	1220	51	64853
5f	-	-	-	-	-	-	-	-	-	-	-	-	-	767	1170	-	-	-	-	-	-	-	-	-	-	1937
5p	-	-	-	-	-	-	-	-	-	73	-	-	728	-	94	-	-	-	-	23	-	-	-	-	-	918
5sw	-	-	-	-	8054	14162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22216
5fm	-	-	-	-	-	-	-	-	-	-	-	139	-	-	-	-	-	-	-	-	-	-	-	-	-	139
Subtotal	227	7807	-	-	9467	14162	-	-	-	231	151	814	2434	5436	15907	1684	12755	5147	3236	1185	1813	796	5540	1220	51	90063
6w	-	-	-	-	-	-	-	-	-	-	-	-	-	82	-	-	-	-	106	-	-	-	-	-	-	188
6p	997	2974	410	263	392	1821	-	-	-	-	-	-	-	12	150	-	-	116	-	-	1688	-	-	526	-	9349
6r	1119	2444	1437	25	257	46	1172	142	-	-	-	25	537	6677	2046	19	-	66	-	-	91	30	174	-	-	16307
6wp	-	-	-	-	-	851	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	851
6wf	-	-	-	971	819	-	2772	1798	-	829	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7189
Subtotal	2116	5418	1847	1259	1468	2718	3944	1940	-	829	-	25	537	6771	2196	19	-	182	106	-	1779	30	174	526	-	33884
7p	-	-	-	-	-	-	-	-	-	275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275
O	3966	9556	1475	331	1476	3426	825	3464	4148	12728	283	302	2493	7086	7904	1919	6174	4325	1490	2124	230	2185	10801	2489	122	91322
Water	-	-	-	-	-	253	535	548	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1361
Total	28205	81380	51375	49305	49825	66435	42575	51295	14335	37090	1130	2325	13380	47815	64730	12000	61040	62645	52340	24445	53540	11525	56695	30150	720	966400

[1] Acreages for Complex Capability units have been calculated on percentage basis and included within the subclass categories.

Tableau 3.3: Bassin de la rivière Nation sud

Les superficies d'utilisation agricole des terres
sont données par municipalités situées dans le bassin

Municipalité	P	C	M	H	HG	G	Sub-Total	A_1	A_2	Z	Z_p acres	Z_r	B	X	E_1	E_2	T	R	K	W	pas classé	Total
Gloucester	200	1102	1803	3324	612	1030	8071	2050	2416	7522	-	-	1647	-	1216	-	527	6	236	-	4504	28205
Osgoode	4317	7461	13096	14210	4911	5254	49249	8156	2104	17866	-	126	1137	216	795	-	1061	489	171	-	-	81380
Cumberland	1110	4142	7423	10218	4276	3173	30342	3115	1166	13476	-	77	1173	51	321	301	-	51	308	-	994	51375
Russell	4351	7149	19428	5837	1073	419	38257	2572	1276	5285	234	69	1161	-	274	63	-	96	18	-	-	49305
Clarence	326	2550	9600	10364	2161	-	25001	2969	962	19665	170	282	376	276	112	12	-	-	-	-	-	49825
Cambridge	1145	12962	8938	9160	2909	114	35228	1508	872	26847	-	478	732	-	147	-	-	-	-	623	-	66435
North Plantagenet	854	340	2915	17565	2054	91	23819	1454	1389	13988	163	470	823	150	84	-	-	72	-	163	-	42575
South Plantagenet	1661	3363	12761	15961	2260	-	36006	1320	1687	10319	76	741	354	52	32	-	-	-	64	644	-	51295
Alfred	-	-	588	6985	414	-	7987	474	254	2920	-	74	-	1912	107	13	494	80	-	20	-	14335
Caledonia	418	1188	7559	14679	1560	-	25404	810	916	3372	173	431	105	5806	60	13	-	-	-	-	-	37090
West Hawkesbury	-	-	379	124	-	-	503	-	30	597	-	-	-	-	-	-	-	-	-	-	-	1130
Elizabethtown	-	77	358	154	147	32	768	-	57	1277	32	-	-	134	57	-	-	-	-	-	-	2325
Oxford	-	119	506	1364	767	817	3573	1087	2062	5664	-	176	25	679	12	-	-	-	102	-	-	13380
Augusta	140	3942	7411	2326	1916	415	16150	3060	5712	18806	140	172	619	2786	338	-	-	-	32	-	-	47815
Edwardsburg	448	5478	7084	2735	6768	802	23315	2658	5805	29151	-	334	108	2908	82	-	269	44	25	31	-	64730
South Gower	-	3088	452	1506	-	403	5449	545	805	4551	-	31	31	445	43	-	-	-	100	-	-	12000
Mountain	1913	6589	16371	16837	1762	-	43472	1818	2875	5938	62	170	283	5919	283	-	-	50	94	76	-	61040
Winchester	2593	11784	24317	14177	1887	-	54758	1038	632	4606	189	145	949	108	145	-	-	-	25	-	-	62615
Matilda	1208	7690	8607	15322	3978	487	37292	2836	3181	8125	-	348	-	-	31	-	196	-	271	-	-	52340
Williamsburg	112	3714	7832	2474	3820	318	18270	723	779	4262	44	-	199	81	25	-	-	50	12	-	-	21445
Finch	2866	9730	14678	11375	1896	1509	42054	1826	1834	6846	-	362	244	-	106	12	-	-	-	256	-	53540
Osnabruck	-	851	2044	1236	1267	175	5573	1032	96	4623	-	-	84	-	175	-	-	-	72	-	-	11625
Roxborough	2290	11638	10525	6596	1293	-	32342	2796	2412	15330	440	307	262	1842	473	154	-	133	-	204	-	56695
Kenyon	798	-	7244	6165	2530	-	16737	130	322	12177	46	314	137	6	85	-	-	65	-	131	-	30150
Lochiel	-	-	-	350	-	-	350	-	-	370	-	-	-	-	-	-	-	-	-	-	-	720
Total	26750	104957	191919	191044	50261	15039	579970	44077	39644	243583	1769	5107	10449	23371	5003	568	2547	1136	1530	2148	5498	966400

Légende

Système d'utilisation agricole des terres

Symbole	Utilisation type
P	Monoculture
C	Maïs
M	Varié
H	Foin
HG	Pâturage et foin
G	Pâturage seul

Utilisation non-agricole des terres

Symbole	Utilisation type
A1	Terre agricole en jachère (1 à 10 ans)
A2	Terre agricole en jachère (10 ans et plus)
Z	Boisé
Zp	Boisé en pâturage
Zr	Reboisement
B	Agglomération
X	Marécage
E1	Extraction-sable-gravier-carrière
E2	Extraction - terre arable
T	Ferme de tourbe
R	Récréation
K	Agriculture spéciale
W	Eau

Table 3.3: South Nation River Basin

Acreages of Agricultural Land Use Systems
By Township That Lie Within The South Nation Basin

Township	P	C	M	H	HG	G	Sub-Total	A_1	A_2	Z	Z_p acres	Z_r	B	X	E_1	E_2	T	R	K	W	Not Classified	Total
Gloucester	200	1102	1803	3324	612	1030	8071	2060	2416	7522	-	-	1647	-	1216	-	527	6	236	-	4504	28205
Osgoode	4317	7461	13096	14210	4911	5254	49249	8166	2104	17866	-	126	1137	216	795	-	1061	489	171	-	-	81380
Cumberland	1110	4142	7423	10218	4276	3173	30342	3115	1166	13476	-	77	1173	51	321	301	-	51	308	-	994	51375
Russell	4351	7149	19428	5837	1073	419	38257	2572	1276	5285	234	69	1161	-	274	63	-	96	18	-	-	49305
Clarence	326	2550	9600	10364	2161	-	25001	2969	962	19665	170	282	376	276	112	12	-	-	-	-	-	49825
Cambridge	1145	12962	8938	9160	2909	114	35228	1508	872	26847	-	478	732	-	147	-	-	-	-	623	-	66435
North Plantagenet	854	340	2915	17565	2054	91	23819	1454	1389	13988	163	470	823	150	84	-	-	72	-	163	-	42575
South Plantagenet	1661	3363	12761	15961	2260	-	36006	1320	1687	10319	76	741	354	52	32	-	-	-	64	644	-	51295
Alfred	-	-	588	6985	414	-	7987	474	254	2920	-	74	-	1912	107	13	494	80	-	20	-	14335
Caledonia	418	1188	7559	14679	1560	-	25404	810	916	3372	173	431	105	5806	60	13	-	-	-	-	-	37090
West Hawkesbury	-	-	379	124	-	-	503	-	30	597	-	-	-	-	-	-	-	-	-	-	-	1130
Elizabethtown	-	77	358	154	147	32	768	-	57	1277	32	-	-	134	57	-	-	-	-	-	-	2325
Oxford	-	119	506	1364	767	817	3573	1087	2062	5664	-	176	25	679	12	-	-	-	102	-	-	13380
Augusta	140	3942	7411	2326	1916	415	16150	3060	5712	18806	140	172	619	2786	338	-	-	-	32	-	-	47815
Edwardsburg	448	5478	7084	2735	6768	802	23315	2658	5805	29151	-	334	108	2908	82	-	269	44	25	31	-	64730
South Gower	-	3088	452	1506	-	403	5449	545	805	4551	-	31	31	445	43	-	-	-	100	-	-	12000
Mountain	1913	6589	16371	16837	1762	-	43472	1818	2875	5938	62	170	283	5919	283	-	-	50	94	76	-	61040
Winchester	2593	11784	24317	14177	1887	-	54758	1088	632	4606	189	145	949	108	145	-	-	-	25	-	-	62645
Matilda	1208	7690	8607	15322	3978	487	37292	2896	3181	8125	-	348	-	-	31	-	196	-	271	-	-	52340
Williamsburg	112	3714	7832	2474	3820	318	18270	723	779	4262	44	-	199	81	25	-	-	50	12	-	-	24445
Finch	2866	9730	14678	11375	1896	1509	42054	1826	1834	6846	-	362	244	-	106	12	-	-	-	256	-	53540
Osnabruck	-	851	2044	1236	1267	175	5573	1002	96	4623	-	-	84	-	175	-	-	-	72	-	-	11625
Roxborough	2290	11638	10525	6596	1293	-	32342	2796	2412	15330	440	307	262	1842	473	154	-	133	-	204	-	56695
Kenyon	798	-	7244	6165	2530	-	16737	130	322	12177	46	314	137	6	85	-	-	65	-	131	-	30150
Lochiel	-	-	-	350	-	-	350	-	-	370	-	-	-	-	-	-	-	-	-	-	-	720
Total	26750	104957	191919	191044	50261	15039	579970	44077	39644	243583	1769	5107	10449	23371	5003	568	2547	1136	1530	2148	5498	966400

LEGEND

AGRICULTURAL LAND USE SYSTEMS

Symbol	Land Use System Type
P	Monoculture
C	Corn System
M	Mixed System
H	Hay System
HG	Pasture System
G	Grazing System

NON-AGRICULTURAL LAND USE SYSTEMS

Symbol	Land Use System Type
A1	Idle Agricultural Land (1-10 years)
A2	Idle Agricultural Land (10 years & over)
Z	Woodland
Zp	Pastured Woodland
Zr	Reforestation
B	Built Up
X	Swamp, Marsh
E1	Extraction - Sand/Gravel Pits/Quarries
E2	Extraction - Topsoil Removal
T	Sod Farms
R	Recreation
K	Specialty Agriculture
W	Water

Il y a plus de 91 000 acres (36 764 ha) de sol organique ou de terre noire dans le bassin. De cette superficie, 27 000 acres (10 908 ha) servent à la production agricole. Ces sols sont importants au cycle hydrologique du bassin puisqu'ils servent de réservoir d'eau pour la régularisation du débit durant les mois d'été. Il faut s'assurer de bien considérer leurs usages potentiels futurs.

Les bénéfices du drainage souterrain sont bien connus en ce qu'il ôte l'excès d'eau et améliore l'aération du sol, ce qui provoque une plus grande productivité et permet plus de souplesse dans le régime agricole tout en permettant d'avancer les semailles et les récoltes. L'installation de drainage augmente considérablement la capacité de production du sol. On peut dire que les sols de classe 2 et 3 ont, après drainage souterrain, des capacités de production semblables aux sols de classe 1. De la même façon les sols de classe 4 et 5 peuvent atteindre des productions de classe 2.

Il y a près de 274 000 acres (110696 ha) de terres, qui bénéficieraient de drainage souterrain. Il faudrait pour cela s'assurer qu'il y a des décharges pour ces drains et que les fossés municipaux soient améliorés afin d'accepter le plus grand débit du drainage souterrain qui réduirait les eaux de surface des terres agricoles. Alors que le drainage de surface permet aux eaux d'orage et aux eaux d'inondation de s'égoutter plus rapidement, le drainage souterrain ôte l'excès d'eau du sol ce qui se traduit par une meilleure structure du sol, un meilleur milieu pour la croissance des racines et une perméabilité améliorée. On peut obtenir ces avantages sur des sols qui normalement n'exigent pas de drainage. Par conséquent une superficie bien au-delà de 274 000 acres (110 696 ha) pourrait, à long terme, bénéficier de drainage souterrain.

Effets des inondations sur l'agriculture du bassin

Il y a deux endroits où les inondations sont fréquentes. L'une est à Brinston et l'autre à Plantagenet. Il y en a deux autres de moindre importance à Vernon et à Bear Brook. Les inondations printanières habituelles dans ces endroits ne sont généralement guère plus que des inconvénients pour la circulation automobile et les transports laitiers, qu'un problème grave pour les cultivateurs. Habituellement ceux-ci sont accoutumés à ces conditions et même quelques-uns d'entre eux considèrent que ces crues printanières accélèrent le dégel du sol et apportent des matières nutritives au sol.

Il n'en va pas de même pour les crues d'été et d'automne. Les inondations de fin de printemps ou de début d'été causent des dommages aux cultures surtout là où les champs ne bénéficient pas de drainage souterrain ou là où les drainages de surface ne peuvent évacuer le surplus d'eau. Il y a dommage quand les cultures sont immergées ou restent plusieurs jours les pieds dans l'eau. De la même façon

There are more than 91,000 acres of organic or muck soils in the Basin, of which about 27,000 acres are in agricultural use. These soils are important in the hydrological cycle of the Basin because they act as water reservoirs and source areas for summer flows. Careful consideration must be given to their potential future uses.

The benefits of tile drainage are well known in terms of removal of soil water and improved aeration, resulting in an increased productivity of the soils, as well as allowing a flexibility in cropping patterns and assisting in early cultivation and harvesting. Installation of tile drains increases the productive capacity considerably. Indications are that Class 2 and 3 lands that are tile drained now have production capacities about equal to Class 1 land. Similarly some Class 4 and 5 land can reach the output levels of Class 2 land.

There are nearly 274,000 acres of land in the Basin that could benefit from tile drainage. Provision of new outlet drains and the improvement of existing municipal ditches and drains will be necessary to provide outlets for the tile drainage and the removal of surface water from agricultural land. While surface drains enable flood and storm water to run off more quickly, tile drainage removes excess soil water which results in improved soil structure, better rooting zone, and improved permeabilities. These benefits can also be obtained on some soils which do not normally require drainage and therefore considerably more than the 274,000 acres could benefit from drainage in the long term.

Effects of Flooding on Agriculture in the Basin

There are two major flood zones at Brinston and Plantagenet, and two minor ones at Vernon and Bear Brook. The annual spring floods that usually occur in these areas are often more of an inconvenience for vehicle movement and milk shipments than a serious problem for farmers. Generally the farmers have adjusted to these conditions and some even consider the spring flood as a benefit from the point of view of thawing the ground and providing nutrients.

The summer and fall floods are a different matter. Late spring/early summer flood waters can cause crop damage, especially where flooded fields are not tile drained, or surface drainage cannot remove excess water. Damage occurs when crops are water-covered or stand in les inondations d'automne retardent les récoltes et créent toutes sortes de problèmes. Selon les estimations locales, les inondations de printemps et d'été à Brinston et à Plantagenet arrivent environ tous les cinq ans.

Fumure

Il n'y a que peu de données sur l'emplois d'engrais dans le bassin. Les données sur les engrais chimiques pour le comté n'ont pas été assemblées depuis 1973. Ainsi, seul des estimations grossières peuvent être faites à partir des données de 1973 et des données provinciales courantes du *Fertilizer Institute of Ontario.*

En 1973, environ 29% des terres en culture du bassin avaient reçu des engrais chimiques au taux de 250 lb/acre (280 kg/ha) ou plus. Les applications ont été faites surtout sur le maïs (42%), l'avoine et les autres céréales (22%), le foin et les pâturages améliorés (35%).

De 1973 à 1979, il semble que l'utilisation des engrais ait augmenté de 30% pour diminuer de 5% en 1980. Si l'on suppose une application moyenne à un taux de 250 lb/ac (280 kg/ha), on peut penser qu'une superficie de 147 000 acres (59 388 ha) a été fertilisée c'est-à-dire quelques 42% des terres en culture du bassin.

Les demandes de test de sol indiquent que la majorité des recommandations étaient destinées au maïs.

On s'attend à ce que l'emploi d'engrais commerciaux augmente dans le bassin puisqu'il y a plus de terres drainées et que les cultures commerciales augmentent en importance. Le fumier est une source importante d'azote et d'autres éléments nutritifs tout en étant un conditionneur pour le sol. Selon les estimés du recensement de 1976 sur le cheptel, près de 8000 tonnes (7256 tonnes métriques) d'azote tirées du fumier ont été produites dans le bassin chaque année.

Érosion du sol et pratiques agricoles

Dans le bassin, la population agricole ne considère généralement pas l'érosion du sol comme un problème. C'est dans le lit même de la rivière que se produit la plus forte érosion. Le long de la rivière les travaux sont affectés et les terrains parfois inondés.

water for several days. Similarly fall flooding creates harvesting delays and related problems when it occurs. Local estimates are that the spring/summer floods occur in the Brinston and Plantagenet areas about once every five years.

Fertilizer Use

There is very limited data available on fertilizer use in the Basin. County-level data on commercial fertilizer was not collected after 1973; therefore, only rough estimates can be made using the 1973 base and current provincial data from the Fertilizer Institute of Ontario.

In 1973, about 29% of the cropped area in the Basin received commercial fertilizer at rates of 250 lbs/acre or more. Applications were mainly on corn (42%), oats and other cereals (22%), hay and improved pasture (35%).

From 1973 to 1979, fertilizer use appears to have increased about 30%, then declining by 5% in 1980. Assuming an average application rate of 250 lbs/acre, some 147,000 acres were fertilized, or about 42% of the crop land in the Basin.

Requests for farm soil tests indicate that a majority of the fertilizer recommendations were for corn.

Commercial fertilizer use in the Basin is expected to increase as more land is drained and cash crops are grown. Animal manure is an important source of nitrogen and other nutrients, as well as being a soil conditioner. Based on Census estimates of livestock numbers in 1976, nearly 8,000 tons of nitrogen are produced in the Basin each year.

Soil Erosion Problems and Agricultural Practices

Soil erosion from agriculture is not generally perceived by the agricultural community to be a major problem in the Basin. The main impact of erosion is identified with the river channel itself, the activities that occur in and along the river valley and channel, and the effects of flooding.

Il est évident qu'il se produit une certaine érosion superficielle et un lessivage des éléments nutritifs du sol sur les grandes superficies d'argile en cultures sarclées. Les orages et pluies abondantes engendrent des érosions par écoulement. Celles-ci entraînent les éléments nutritifs dissous que l'on trouve dans les particules d'argile fine et qui sont transportées par l'écoulement superficiel.

L'érosion des berges là où les animaux traversent le lit de la rivière et aux endroits où ils s'abreuvent ne semble pas poser de problème. Toutefois, les défécations des bestiaux dans l'eau contribuent à en réduire la qualité, surtout durant les périodes de faible débit.

Irrigation dans le bassin

Les données de 1970 indiquent que près de 3800 acres (1535 ha) de terres ont été irriguées dans les comtés du bassin. La majeure partie de cette irrigation s'est faite dans les fermes de tourbe. On ne possède aucun renseignement présent bien que l'on pense que l'on n'a guère augmenté l'irrigation en raison du fait que les pluies sont généralement suffisantes pendant la saison de croissance.

Bien qu'un appoint d'irrigation serait avantageux à toutes les cultures, surtout les cultures maraîchères, il y a environ 35 000 acres (14 140 ha) de terres en culture bien qu'elles manquent d'humidité. Ces sols auraient une meilleure productivité grâce à l'irrigation. Il ne faut pas oublier toutefois, que l'irrigation sur une grande superficie exigerait une réserve d'eau substantielle. De toutes façons l'irrigation à petite échelle pourrait utiliser l'eau des étangs de ferme ou même des puits.

Conséquence des changements de l'environnement sur l'agriculture

Les données du recensement de 1971 indiquent qu'environ 9500 acres (3838 ha) des terres agricoles du bassin ont été arrosées avec des insecticides et près de 77 000 acres (31 108 ha) avec des herbicides. Les enquêtes effectuées en 1973 et 1978 et compilées pour les comtés par la Direction de l'économie du ministère de l'Agriculture et de l'alimentation de l'Ontario, révèlent des augmentations substantielles de l'emploi des pesticides. De 1973 à 1978, l'emploi des herbicides a presque doublé et le montant d'insecticides et de fongicides utilisés s'est augmenté de plus de 50%. On peut s'attendre à ce que les pesticides jouent un rôle important au soutien de la capacité de production des agriculteurs du bassin.

Les dommages aux cultures par les oiseaux et autres animaux sauvages ne sont pas bien connus, pas plus que l'on ne connaît les pertes de bestiaux. On pense qu'il n'y a pas là matière à inquiétude tout au moins pour le moment.

There is likely to be some sheet/nutrient-type erosion on the extensive areas of clay soils that are clean cultivated. Storms and heavy rains will generate erosional run-off under these conditions where dissolved nutrients are associated with fine clay particles that are carried away in the surface water run-off.

Bank erosion at cattle crossings and watering points does not appear to be a serious problem in the Basin; however, livestock mucking and defecating in the water contributes to reducing water quality, especially during the periods of low flow.

Irrigation in the Basin

1970 data indicates that nearly 3,800 acres were irrigated in the Basin counties. Much of this was on sod farms, as well as fruit and vegetables. No current acreage estimates are available, although the amount of irrigation does not appear to have increased significantly, since rainfall is generally adequate during the growing season.

While supplimental irrigation will benefit many crops, especially horticultural crops, there are about 35,000 acres of moisture deficient soils currently under agricultural use in the Basin. These soils would have higher productive capacity with irrigation; however, any large scale irrigation project would require substantial water storage. Alternatively, small scale supplemental irrigation could utilize water from farm ponds or point wells.

Impact of Environmental Changes in Agriculture

Data from the 1971 Census indicates that about 9,500 acres on farms in the Basin were sprayed with insecticides and nearly 77,000 acres with herbicides. Surveys carried out in 1973 and 1978 and compiled at the county level by the Economics Branch, OMAF, indicate substantial increases in the use of pesticides. From 1973 to 1978, the use of herbicides nearly doubled in the Basin and the amount of insecticides and fungicides used increased by more than 50%. Pesticides are likely to continue to play a major role in sustaining the productive capacity of agriculture in the Basin.

Crop damage from birds and other wildlife is not well documented. Nor is loss of livestock. It is not thought to be serious or widespread at the present time in the Basin.

Quantité et qualité de l'eau pour l'agriculture

Présentement, on ne considère pas que les exploitations agricoles ont des difficultés d'approvisionnement en eau bien qu'il y ait des cas isolés de pénurie et de mauvaise qualité. Quand le débit des cours d'eau est faible, il y a moins d'eau disponible pour les bestiaux. Il n'y a pas d'indication encore que les engrais chimiques aient joué un rôle important à la réduction de la qualité des eaux de la rivière Nation sud et de ses affluents du bassin hydrographique. Les écoulements faisant suite à l'épandage du fumier peuvent contribuer à diminuer la qualité de l'eau. Le ministère de l'Environnement de l'Ontario a remarqué des quantités élevées de bactéries et de colibaciles ainsi que des taux de scuffre plus élevés que le seuil acceptable, mais l'on a pu en découvrir l'origine.

PRODUCTION DE DENRÉES ET COMMERCIALISATION

La production de denrées et leur commercialisation dans le bassin a été étudiée selon cinq rubriques importantes différentes. Ce sont les exploitations laitières et de boucherie, les oeufs et la volaille, les grandes cultures, les cultures horticoles ou maraîchères et les autres cultures.

Exploitations laitières et de boucherie

La commercialisation et l'abattage dans l'est de l'Ontario sont brièvement décrits en même temps que les industries laitières, du boeuf, du porc et des moutons. Pour chacun de ces élevages on a cherché à montrer une vue d'ensemble du côté production de l'industrie ainsi qu'une brève description de la commercialisation. On trouvera ci-dessous le nombre de bestiaux.

Bestiaux	Nombre total	
	1971	1976
bestiaux de boucherie	151 154	146 815
vaches laitières	79 638	71 790
porcs	35 842	24 026
moutons	2 171	4 646
poules et poulets	995 836	870 232
poules pondeuses	708 675	596 409
dindons	65	312
oies	566	1 323
canards	508	1 494

Water Quantity and Quality Problems in Agriculture

Generally agriculture in the Basin is not experiencing any lack of water quantity at the present time, although there are some isolated problems of both quality and quantity. The issue of low flow in streams is important in terms of availability of water for livestock. In terms of quality, there is no evidence to indicate that the use of commercial fertilizers are major contributors to lowering water quality in the South Nation River Basin and its tributaries. Seepage from livestock manure disposal may be contributing to the lowering of water quality. High bacteria and coliform counts, and higher than acceptable levels of phosphorus have been identified by the Ontario Ministry of the Environment; however, sources were not identified.

COMMODITY PRODUCTION AND MARKETING SYSTEMS

Commodity production and marketing systems in the Basin are examined under five major headings. They are the dairy and livestock system, eggs and poultry, field crops, horticultural crops, and other crops.

Dairy and Livestock System

Marketing and slaughtering systems in Eastern Ontario are briefly described, together with the dairy, beef, hog, and sheep industries. For each of the livestock groups, an attempt has been made to present an overview of the production side of the industry as well as a brief description of the marketing system. Livestock numbers are shown below.

	Total Number	
Livestock	1971	1976
Cattle	151,154	146,815
Milk Cows	79,638	71,790
Pigs	35,842	24,026
Sheep	2,171	4,646
Hens & Chickens	995,836	870,232
Laying Hens	708,675	596,409
Turkeys	65	312
Geese	566	1,323
Ducks	508	1,494

Vaches laitières: La production de lait est l'activité agricole la plus importante du bassin. En 1976, presque les trois-quarts de tous les cultivateurs dont les ventes dépassaient 2500$ ont reçu la majeure partie de leurs revenus de la vente du lait. Les 1341 agriculteurs du bassin enregistrés auprès de l'Office de commercialisation du lait de l'Ontario (OMMB), ont vendu en 1980 un total de 260 millions de litres de lait. Les ventes moyennes par fermes étaient de 193 000 litres par rapport aux 184 000 litres des fermes laitières du sud de l'Ontario. L'OMMB étant le seul acheteur et vendeur de lait, il n'a pas été nécessaire de faire une analyse du marché pour le lait et les produits laitiers.

Boeuf: La production de boeuf n'a pas jamais été très importante dans le bassin, par rapport à la production laitière. De nombreux producteurs de boeuf possèdent également d'autres entreprises agricoles ou encore travaillent à des emplois non-agricoles. Il n'y a que peu de parquets d'engraissement dans le bassin et selon toute vraisemblance on ne peut prévoir d'accroîssement important dans un proche avenir. La demande totale de boeuf dans la région d'Ottawa-Hull en 1976 avait été estimée à 148.9 millions de livres (67 950 tonnes métriques). Seules quelques 46.3 millions de livres (21 002 tonnes métriques) ont été abattus localement. On évalue la demande de veau à quelques 6.6 millions de livres (2994 tonnes métriques) et seulement un huitième de ce montant a été abattu localement.

La proportion des abattages de bestiaux produits dans le bassin ne peut pas être déterminée en raison des déplacements continuels de bétail qui entrent et sortent du bassin.

Porcs: Le nombre de porcs dans le bassin a varié grandement depuis 1971. Le point le plus bas fut atteint en 1976 avec 24 000 têtes et le plus haut en 1980 avec 43 000 têtes. Les entreprises de sevrage et de naissage-engraissage sont les plus fréquentes. Un grand nombre de porcelets sevrés sont vendus à des fermiers du Québec pour y être finis. Le maïs de l'Ontario suit l'itinéraire des porcs vers le Québec. Nous pensons qu'environ 100 000 porcelets sevrés quittent le bassin chaque année pour être finis ailleurs en Ontario ou au Québec. Les trois-quarts des élevages de porcs du bassin ont vendu 50 porcs ou moins en 1979 alors que seulement 8% en ont vendus plus de 500. Pour la province entière ces chiffres sont 53% et 10% respectivement. En 1976, environ 6% des 71,6 millions de livres (32 478 tonnes métriques) de porc consommés dans la région provenaient des abattoirs locaux.

Dairy: The production of milk is the single most important agricultural activity in the Basin. In 1976, almost three-quarters of all farmers with sales of over $2,500 received the major share of their income from the production of milk. The 1,341 farmers in the Basin that were registered with the Ontario Milk Marketing Board in 1980 sold a total of nearly 260 million litres in that year. Average sales per farm were 193,000 litres, compared with 184,000 litres per farm in Southern Ontario. Since the Ontario Milk Marketing Board is the sole purchaser and seller of milk no market analysis was carried out for milk and milk products.

Beef: The production of beef has traditionally not been important in the Basin, compared with dairy farming. Many of the beef producers have other farm enterprises, or have off-farm jobs. There are few feed lots in the Basin and there is not likely to be any major increase in the number of feed lots in the foreseeable future. Total demand for beef in the Ottawa-Hull area in 1976 was estimated to be 148.9 million pounds. Only about 46.3 million pounds were slaughtered locally. Veal demand was estimated at some 6.6 million pounds and only about one-eighth was slaughtered locally.

The proportion of the livestock slaughter which is produced in the Basin can not be determined, due to the continuous movement of livestock into and out of the area.

Hogs: Hog numbers in the Basin have fluctuated widely since 1971, from a low of 24,000 in 1976 to a high of 43,000 in 1980. Weaner enterprises and farrow to finish enterprises are the most common. Many of the weaner pigs are sold to Québec farmers for finishing, with Ontario corn following the pigs to Québec. We believe that about 100,000 weaners leave the Basin area to be finished elsewhere in Ontario and Québec. Three-quarters of the Basin area hog farms sold 50 or less hogs in 1979, and only 8% sold more than 500 hogs, compared with 53% and 10% across the province. In 1976 about 6% of 71.6 million pounds of pork consumed in the area went through local slaughter houses.

Moutons: Il y a un petit groupe convaincu d'éleveurs de moutons et d'agneaux dans le bassin. La tendance se dirige vers quelques grands élevages commerciaux et un nombre de plus en plus grand de petits élevages dans les fermes à temps partiel ou d'agriculture jardinée. En 1971, il y avait 2171 moutons dans 45 élevages. En 1976, il y en avait 4646 dans 83 élevages. La majorité des agneaux produits dans la région sont vendus localement pour le marché en frais et pour la congélation.

Oeufs et volaille: De 1971 à 1976, il y a eu une réduction du nombre d'exploitations qui gardent des volailles et une réduction de 17% tant du nombre de producteur d'oeuf que du nombre de poules pondeuses. En 1976, environ 96% des poules et poulets étaient répartis sur 62 exploitations et 97% des poules pondeuses sur 59 exploitations.

La structure de l'industrie ovicole va sans nul doute se concentrer de plus en plus. Le potentiel d'augmentation de la production est limité. La production et la commercialisation des oeufs est contrôlée par l'Office de commercialisation des oeufs de l'Ontario et par conséquent nous n'avons effectué aucune analyse du marché des oeufs.

Grandes cultures: Le tableau 4.4 du texte indique les superficies en grandes cultures dans le bassin.

La structure de commercialisation des grandes cultures produite dans le bassin est à la fois locale et internationale. Alors que la production de foin dépasse toutes les autres, la plus grande partie est utilisée dans le bassin. Il y a présentement une demande de foin dans d'autres régions et le marché de l'exportation devrait être considéré dans l'avenir. La principale culture commerciale est le maïs. Les céréales et le soya sont également utilisés pour l'alimentation des bestiaux du bassin. Il y a cependant un marché d'exportation grandissant pour ces denrées. Nous n'avons pas effectué d'analyse de marché particulière en raison du fait que toute augmentation de la production des cultures commerciales dans le bassin ou dans l'est de l'Ontario ne changerait la situation du marché. Ce qui importe pour le producteur, est que pour s'approprier

Sheep: There are a small group of dedicated sheep and lamb producers in the Basin. The trend has been to a few large commercial flocks, and an increasing number of small flocks on hobby or part-time farms. In 1971, 45 farms reported 2,171 sheep and in 1976, 83 farms reported 4,646 animals. Most of the lamb produced in the area is sold locally for the fresh market and freezer trade.

Eggs and Poultry Production:

From 1971 to 1976 there was a reduction in the number of farms with poultry and a 17% reduction in both the number of farms with laying hens and the number of hens. In 1976 about 96% of the hens and chickens were on 62 farms and 97% of the laying hens were on 59 farms.

The structure of the egg industry will likely become more concentrated and the potential for increasing production is limited.

The production and marketing of eggs is controlled by the Ontario Egg Producers' Marketing Board and therefore no area market analysis was carried out for eggs.

Field Crops:

Table 4.4 from the text shows the acreages of crop production in the Basin.

The marketing structure for the field crops produced in the Basin is both local and international. While hay is the largest volume crop, most of it is used within the Basin. At present there is a demand for hay in other areas and this export market should be considered in the future. The major cash crops of corn, grains and soybeans are also used mainly as livestock feed in the Basin. There is, however, a growing world market for these commodities. No specific market analysis was done in this regard because any increase in production of cash crops in the Basin or Eastern Ontario would not affect the market situation. What is important to the individual producers is that to gain a share of growing une partie du marché en croissance, il doit ajuster ses systèmes de production de façon à ce qu'ils conviennent aux normes qualitatives et quantitatives imposées par les acheteurs commerciaux ou industriels. Ceci signifie également que nous aurons alors besoin dans l'est de l'Ontario de plus amples services de manutention, d'entreposage et de livraison de ces denrées aux marchés spéciaux.

Cultures horticoles:

Il y avait en 1971, 35 producteurs dont la principale source de revenu provenait de la vente des fruits et des légumes. En 1976, ce chiffre s'est élevé jusquà 51. Le tableau 4.4 indique la superficie occupée par ces producteurs.

Les producteurs de fruits et légumes du bassin ont une longue histoire de production commerciale et de commercialisation de leurs produits. La mise au point de la pomme McIntosh en est un exemple. La production de légumes dans la municipalité de Cumberland en est un autre. Plus récemment, les consommateurs cherchant de plus en plus des produits frais, une nouvelle sorte d'exploitation "le cueillez-le vous-même" est apparu. A l'extrême opposé, il y a un petit nombre de producteurs qui ont ajusté avec succès leurs exploitations en une production commerciale de pommes de terre et de navets pour le marché du gros d'Ottawa.

Les augmentations de production destinées à remplacer les importations sur les marchés de l'est de l'Ontario doivent s'orienter vers la satisfaction de la demande des marchés commerciaux. Par exemple, les denrées vendues aux grossistes d'Ottawa doivent être de bonne qualité uniforme, dans des paquets règlementaires et les livraisons doivent être régulières de telle façon qu'elles puissent être en compétition avec les denrées importées.

Puisque l'on s'attend à ce que la population de l'est de l'Ontario s'élève à 1,2 million en 1981 et à 1,3 million en 1996, et qu'il y a de sérieux efforts au remplacement des importations, il y a un potentiel certain à l'élargissement de la production des fruits et des légumes pour une superficie de quelques 2700 acres (1090 ha) jusqu'à cette date.

markets they must tailor their production systems to the quality and quantity standards dictated by commercial or industrial buyers. This also means that new and expanded systems to handle, store and deliver commodities into special markets will be needed in Eastern Ontario.

Horticulture:

There were 35 growers whose main source of income was from fruit and vegetable production in 1971. By 1976 the number had risen to 51 growers. Table 4.4 indicates the acreages used by these growers.

Fruit and vegetable growers in the Basin have a long history of commercial production and marketing of their products. The development of the McIntosh apple is one example. Vegetable production in Cumberland Township is another. More recently the interest of consumers in obtaining farm-fresh produce has led to the development of a new group of producers with pick-your-own operations. At the other extreme is a small number of growers that have successfully tailored their operations to commercial production of potatoes and turnips for the Ottawa wholesale trade.

Increases in production aimed at import substitution in Eastern Ontario markets must be geared toward the demands of the commercial market. For example, produce sold to Ottawa wholesalers must be uniformly good quality, in regulation packs, with a predictable supply schedule so that it can compete with imported produce.

With the Eastern Ontario population expected to grow from 1.2 million in 1981 to more than 1.3 million by 1996, and serious efforts toward import substitution, we believe that there is a potential to expand fruit and vegetable production by an additional 2,700 acres over that period.

TABLEAU 4.4
Superficies en culture dans le bassin de la rivière Nation sud 1971 et 1976

Culture	Superficie totale (acre)		Culture	Superficie totale (acre)	
	1971	1976		1971	1976
Foin cultivé	156 834	175 484	Haricots de grande culture	56	130
Maïs d'ensilage	42 066	58 789	Soya	171	69
Maïs-grain	38 075	36 066	Lin	-	7
Avoine-fourrage	4 758	8 553	Tournesol	113	15
Autres fourrages	2 749	4 347	Colza	-	21
Avoine	42 960	35 086	Moutarde	-	139
Orge	6 052	5 430	Pommes de terre	1 626	1 261
Céréales mélangées	19 246	17 353	Tabac	-	2
Blé	1 037	2 429	Autres cultures	1 831	1 781
Seigle	146	208	Légumes	528	599
Sarrasin	739	1 199	Arbres fruitiers	408	564
Pois de grandes cultures	32	-	Petits fruits	22	33
			Superficie totale	319 449	349 565

TABLE 4.4

Crop Acreages in South Nation Basin Area
1971 and 1976

Crop	Total Acreage		Crop	Total Acreage	
	1971	1976		1971	1976
Tame Hay	156, 834	175, 484	Dry Field Beans	56	130
Corn Silage	42,066	58, 789	Soy Beans	171	69
Grain Corn	38, 075	36,066	Flaxseed	-	7
Fodder Oats	4, 758	8, 553	Sunflower	113	15
Other Fodder	2, 749	4, 347	Rapeseed	-	21
Grain Oats	42, 960	35, 086	Mustard	-	139
Barley	6, 052	5, 430	Pototoes	1, 626	1, 261
Mixed Grains	19, 246	17, 353	Tobacco	-	2
Wheat	1, 037	2, 429	Other field crops	1, 831	1, 781
Rye	146	208	Vegetables	528	599
Buckwheat	739	1, 199	Tree fruits	408	564
Dry Field Peas	32	-	Small fruits	22	33
			Total Acres	319, 449	349, 565

Autres cultures: Un certain nombre d'autres cultures et de denrées ont été examinés dans la présente étude. Ce sont surtout des cultures spéciales qui exigent que le producteur acquiert des connaissances particulières et fasse des investissements pour la production et la manutention afin de s'assurer que ses produits conviennent bien à un marché limité et concurrentiel.

Other Crops:

A number of other crops and commodities were examined in this study. Primarily, they were specialty crops that require producers to develop specialized skills and investments in production and handling to meet the needs of a limited and competitive market.

CONCLUSIONS ET RECOMMANDATIONS

La section finale de la présente étude fait l'énoncé d'une série de conclusions et de recommandations au sujet des diverses denrées, du développement rural ainsi que de la gestion des terres et de l'eau. Puisqu'il n'y a aucun canevas de planification pour l'agriculture de l'est de l'Ontario, il faudrait faire des études supplémentaires pour établir ce canevas et obtenir des informations permettant de concevoir des programmes de développement pour l'agriculture et la gestion des ressources.

Développement du secteur des denrées

Lait: On s'attend à ce que la tendance vers un plus petit nombre de grandes exploitations laitières se poursuive puisque celles dont les effectifs sont faibles prennent leur retraite ou quittent la production. L'expansion des fermes laitières dépendra de la capacité des fermiers locaux d'acheter plus de contingents laitiers. Parmi les autres possibilités d'augmentation des revenus, on remarque la production de veau et les cultures commerciales.

Boeuf: A long terme, les bestiaux de boucherie seront gardés principalement pour faire le nettoyage des exploitations de cultures commerciales ou dans les exploitations à temps partiel. La production de boeuf et de veaux à partir de bétail laitier devrait être encouragée comme source secondaire de profits dans les exploitations actuelles ou dans les petites exploitations indépendantes. Parmi les difficultés d'expansion de l'industrie du boeuf on remarque le manque d'abattoirs. On a donc recommandé qu'une étude soit faite sur la possibilité d'implantation d'un abattoir local et sur la commercialisation locale. Si cela était possible alors il serait également possible d'encourager l'établissement de grands parquets d'engraissage dans le bassin.

Porcs: Les caractéristiques de la production du porc laissent entendre que c'est une entreprise secondaire dans bien des exploitations. Leur nombre va continuer de varier parallèlement aux prix du porc et des provendes. Il semble qu'il y ait une possibilité de développement de la finition des porcs sevrés livrés au Québec et partout ailleurs en Ontario. Il faudrait peut être avoir un abattoir pour que plus de porcs soient acceptés sur le marché d'Ottawa.

CONCLUSIONS AND RECOMMENDATIONS

The final section of this study spells out a series of conclusions and recommendations dealing with individual commodities, rural development, and land and water management. Since there is no planning framework for Eastern Ontario agriculture, additional studies are required to provide this framework and the essential information to design development-oriented programs for agriculture and resource management.

Commodity Development

Dairy: The trend to fewer and larger dairy farms is expected to continue as those with smaller herds retire or leave the industry. Expansion of the industry will depend on the farmers' ability to buy additional milk quota. Other opportunities for additional income may include veal production and expansion into cash crops.

Beef: In the long term, beef cattle will be kept mainly as scavengers on cash crop farms or on farms operated by part-time farmers. Dairy beef and veal production should be encouraged as a secondary profit centre on existing farms or as small scale independent operations. One of the major constraints identified for the beef industry was the lack of a slaughtering facility. It was therefore recommended that a study be conducted on the feasibility of a local slaughtering plant and more local marketing. If such a facility were available large scale beef feedlots could be encouraged to develop in the Basin.

Hogs: The characteristics of hog production suggest that they are a secondary enterprise on many farms in the Basin, and that numbers will continue to fluctuate with pork prices and feed supplies. The opportunity for development appears to lie with being able to feed out the weaner pigs currently being shipped to Québec and elsewhere in Ontario. This development may require a slaughtering facility so that more local pork can enter the Ottawa market.

Moutons: La production de moutons et d'agneaux augmente dans le bassin et l'on s'attend à ce que cette tendance continue. C'est la production qui convient bien aux fermiers à temps partiel et à ceux qui pratiquent l'agriculture jardinée. C'est aussi une bonne source secondaire de revenus pour les grandes exploitations.

Oeufs et volaille: On ne s'attend guère à une augmentation de la production des oeufs dans un avenir rapproché. On s'attend à des réajustements internationaux mais ceux-ci ne devraient apporter que peu de chances de croissance. L'industrie de la volaille dans le bassin est très modeste en raison de l'absence d'abattoir. Les oiseaux doivent être transportés jusqu'à Aurora ou Kitchener. Selon les conditions actuelles il ne semble pas qu'un abattoir soit construit prochainement dans l'est de l'Ontario. Les canards et oies sont élevés par des particuliers pour leur propre consommation ou comme petit appoint.

Maïs: Le maïs-grain représente une excellente possibilité potentielle comme culture commerciale tout comme pour l'alimentation du bétail à la ferme. Les possibilités de marché comprennent les provendes de l'est de l'Ontario et du Québec et un certain nombre de clients industriels. Il existe des marchés spécialisés du maïs-grain qui deviendront de plus en plus intéressant pour les cultivateurs en raison des prix élevés supérieures au prix du maïs N° 2. Ces marchés comprennent l'huile et la fécule de maïs, les céréales de déjeuner, et les boissons alcooliques. La production pour ces marchés exige un engagement à un marché particulier pour la culture d'un produit de haute qualité et pour la construction d'installations de manutention appropriées si l'on n'a pas accès à des stations de collecte bien équipées.

Soya et oléagineux: La culture du soya est pleine de promesses dans le bassin. On devrait encourager localement la production. La construction d'installations de manutention et de commercialisation devrait être organisée spécialement pour le soya. Il faudrait mettre l'accent sur la production et la commercialisation d'un soya de haute qualité destiné à la production d'huile.

D'autres oléagineux comme le canola (colza), le tournesol, la moutarde jaune et brune, possèdent un bon potentiel comme cultures commerciales.

Sheep: Sheep and lamb production is increasing in the Basin and this trend is expected to continue. Sheep and lamb production is recommended for part-time and hobby farms, as well as a secondary operation on larger farms.

Eggs and Poultry: Egg production is not expected to show much change in the foreseeable future. Some internal consolidation is expected but there is likely to be little opportunity for growth. The poultry meat industry in the Basin is very small because there is no slaughtering facility. Currently birds have to be trucked to Aurora or Kitchener. There is not likely to be such a facility established in Eastern Ontario under the current system. Other poultry such as ducks and geese will continue to be raised as a hobby or small sideline operation.

Corn: Grain corn has an excellent potential for expansion as a cash crop, as well as for on-farm feed. Market opportunities include the feed trade in Eastern Ontario and Quêbec, and a number of industrial users. Specialized markets exist for grain corn that will become increasingly attractive to growers because of the premium prices that are paid over the No. 2 corn price. These markets include corn oil and starch, breakfast foods, and beverage alcohol. Production for these markets requires a committment to the specific market in terms of growing a suitable high quality product and installation of appropriate handling facilities, or have access to properly equipped collection stations.

Soybeans & Oil Seeds: Soybeans are a promising new cash crop in the Basin. Production should be promoted locally, and a system of handling and marketing should be organized specifically for soybeans, with emphasis on the production and marketing of a top quality crushing bean.

Other oil seeds such as canola, sunflower, yellow and brown mustard have potential as cash crops.

Céréales: On continuera de cultiver des céréales principalement pour l'alimentation des bestiaux. L'orge continuera à supplanter l'avoine dans un proche avenir. Les superficies en blé d'hiver vont augmenter en rotation avec le soya.

Luzerne: La luzerne est en excellente position pour fournir une grande proportion des protéines pour les bestiaux tout en étant de plus une excellente denrée de transformation et d'exportation. Il y a deux possibilités. On expédie déjà la luzerne en balle comme fourrage et ce marché peut facilement augmenter. De plus il y a des marchés locaux et d'exportation pour la luzerne déshydratée en granules. Les cultivateurs du bassin et des alentours ont besoin d'un cultivar de luzerne qui serait mieux adapté aux conditions locales.

Cultures horticoles: L'avenir des cultures maraîchères dans le bassin dépend principalement de la capacité des producteurs à alimenter le marché du gros d'Ottawa et plus tard de transformer et d'exporter quelques denrées. Il faut pour cela avoir de nouveaux arrangements de commercialisation entre les acheteurs et les vendeurs, en même temps que d'importants investissements à la production, la manutention, l'entreposage et autres installations. Nous avons fait l'examen de onze cultures de fruits et légumes sur le marché d'Ottawa.

Autres: Toutes ont un certain potentiel d'expansion. Toutefois, il est nécessaire pour le producteur de choisir un marché et de se spécialiser afin de satisfaire aux exigences de ce marché particulier. Ceci implique la quantité de production, la qualité, la manutention, l'empaquettage, l'entreposage et les livraisons. Toute augmentation d'importance de la production des fruits et des légumes dans le bassin et les régions avoisinantes devra d'abord passer par une analyse approfondie des possibilités d'exportation de grandes quantités de produits de qualité ainsi que du potentiel d'établissement d'installations de transformation dans l'est de l'Ontario.

Un certain nombre d'autres cultures ont été étudiées dans le cadre de la présente étude et des recommandations ont été faites pour chacune.

Grains: Cereal grains will continue to be produced as a major source of livestock feed in the Basin. Barley will continue to replace oats for the near future. Winter wheat acreage is likely to expand in the rotation with soybeans.

Alfalfa: Alfalfa has the potential to provide a larger portion of the protein for livestock, as well as a commodity for processing and export. There are two possibilities in this regard. Alfalfa is already being exported in baled form for hay and the opportunities for expansion in this area should be explored further. Also, local and export markets for dehydrated alfalfa pellets for feed should be examined. One of the needs in the Basin and adjacent areas is for new alfalfa cultivars that are better adapted to local conditions.

Horticulture: The future for expanded horticultural crop production lies initially in being able to supply a larger portion of the Ottawa wholesale trade, and later to process or export some commodities. This will require new marketing arrangements between buyer and seller, as well as extensive investment in production, handling, storage and other facilities. Eleven fruit and vegetable crops were examined in the Ottawa market.

Other: All have some potential for expansion - as do others; however, a grower has to identify a specific market and gear his/her production to meet the requirements of that particular situation, including quantity, quality, handling, pack, storage, and delivery. Any large scale development of fruit and vegetable production in the Basin and adjacent areas would have to be preceded by a thorough analysis of area export opportunities for large volumes of quality produce, as well as the potential for establishing processing facilities in Eastern Ontario.

A number of other crops and livestock were examined in the study and recommendations are put forward for each one.

GESTION DES TERRES ET DE L'EAU

Drainage

Plus de 78 000 acres (31 512 ha) de terres du bassin bénéficient déjà d'un drainage souterrain et nous estimons que 274 000 acres (110 696 ha) supplémentaires bénéficieraient du même traitement. Étant donné qu'il est important pour les producteurs de réduire les risques et d'augmenter les revenus de l'exploitation, nous recommandons qu'une stratégie et qu'un plan directeur soit préparé dans le bassin au palier des municipalités. Cette stratégie et ce plan directeur devrait prendre en considération une nouvelle conception des fossés, des mesures correctives, des conséquences économiques et environnementales et l'examen du système présent d'établissement des priorités.

Nous recommandons également que l'on établisse des politiques afin de préserver du drainage des terrains uniques et délicats. Ceci comprend également les charges et décharges importantes d'eau souterraine qui pourraient être affectées par le drainage superficiel ou souterrain.

Irrigation

Bien que l'irrigation n'ait jamais été un élément important de l'agriculture du bassin, sauf pour quelques cultures horticoles et les fermes de tourbes, on recommande que l'on encourage l'irrigation dans des conditions limitées afin d'assurer un bon usage des ressources aquatiques. Le coût et les bénéfices de l'irrigation des cultures dans l'est de l'Ontario devrait faire l'objet d'une étude.

Développement des terres

Nous avons mené une étude séparée des terres agricoles inutilisées dans le but de connaître l'utilisation potentielle de ces terres et les raisons de leur abandon. Des 84 000 acres (33 936 ha) de terres agricoles abandonnées, environ 5 600 acres (2262 ha) sont retournées à l'agriculture et quelques 10 000 acres (4000 ha) possèdent un potentiel agricole. Les quelques 68 000 acres (27 472 ha) qui restent ne conviennent généralement pas à l'agriculture.

LAND AND WATER MANAGEMENT

Land Drainage

More than 78,000 acres have already been tile drained in the Basin and we estimate that an additional 274,000 acres could benefit from tile drainage. In light of the importance of drainage to farmers in reducing rish and increasing farm income, we recommend that a strategy and master plan for surface and subsurface drainage development be prepared for the Basin at the township level. The strategy and master plan should include consideration of new ditch design, remedial measures, economic and environmental impacts, and a review of the current system of establishing priorities.

We also recommend that policies be formulated to prevent drainage of unique or sensitive lands, including important groundwater recharge or discharge areas that could be damaged by surface or subsurface drainage.

Irrigation

While irrigation has not been an important element of Basin agriculture beyond some horticultural crops and sod farms, it is recommended that additional irrigation be encouraged under limited conditions to ensure proper use of the water resource. Costs and benefits from crop irrigation in Eastern Ontario need to be identified.

Land Development

A separate study of idle agricultural land was carried out to identify the future use potential of these lands and the reasons for idleness. Of the 84,000 acres mapped as idle agricultural land, about 5,600 acres have gone back to agricultural use and another 10,000 acres have some agricultural potential. The remaining 68,000 are generally not suitable for agricultural use.

Conservation du sol et de l'eau

Cinq recommandations sont proposées afin de mettre en valeur la capacité agricole du bassin:

- Mettre au point un programme de conservation du sol et de l'eau qui comprenne la gestion du fumier et cela en coopération avec les groupes locaux,
- Surveiller et évaluer l'érosion du sol,
- Surveiller la compacité du sol et fournir des informations connexes,
- Étudier d'autres façons d'abreuver les bestiaux le long des cours d'eau,
- Mettre en oeuvre un code de pratique au palier de la municipalité.

CONSÉQUENCES ÉCONOMIQUES ET DE DÉVELOPPEMENT

Conséquences économiques du drainage souterrain

On considère que le drainage souterrain est essentiel pour les cultivateurs afin qu'ils puissent produire des cultures commerciales de grande valeur sur la plus grande partie des terres de l'est de l'Ontario. Le drainage réduit les risques des pertes à la production et souvent donne d'appréciables augmentations de la production, surtout quand la gestion est bonne. Quelques estimations faites au cours de la présente étude indiquent que l'accroissement des revenus à l'acre pourrait être aussi élevé que 28,00 à 89,00$ (69,20 à 220,00 $/ha) pour le soya* et de la même façon de 58,00 à 138,00$ (143,30 à 341,00 $/ha) pour le maïs.

Si l'on effectuait le drainage souterrain de la totalité des 274 000 acres (110 696 ha) du bassin et s'ils étaient cultivés de façon très conventionelle, l'augmentation annuelle du revenu net des fermiers serait de l'ordre de 6,3 millions de dollars.

Conséquences économiques des inondations

La valeur potentielle des pertes de récolte dues au crues tardives de printemps ou d'automne dans les quatre zones de crues a été estimée à partir des cartes d'utilisation des terres et des données sur la valeur des cultures. Dans les conditions actuelles de ces zones, la valeur totale des cultures qui peuvent être détruites par une crue persistante tard au printemps ou en automne serait de l'ordre de 1,4 million de dollars. Si cette région agricole était équipée de drainage souterrain de façon à s'approcher de la valeur optimale de production du

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* Coût annuel du drainage souterrain subventionné à 42,00 $/acre (103,80 $/ha) ôté du revenu brut.

Soil and Water Conservation

Five recommendations are put forward to enhance the long term productive capacity of the agricultural land base:

- Develop an on-going soil and water conservation program, including manure management, in cooperation with other local groups
- Monitor and assess soil erosion problems
- Monitor soil compaction problems and provide related extension service
- Investigate alternate livestock watering methods along water courses
- Implement the Agricultural Code of Practice at the township level.

ECONOMIC AND DEVELOPMENT IMPACTS

Economic Impact of Tile Drainage

Tile drainage is considered to be essential for growers to produce high value cash crops on much of the land in Eastern Ontario. Drainage reduces crop production risks and often results in sharp increases in crop yield, particularly under good management. Some estimates made during this study indicate that net income per acre could increase anywhere from $28.00 to $89.00 with soybeans after drainage*, and similarly from $58.00 to $138.00 with corn.

If the entire 274,000 acres in the Basin that are suitable for drainage were drained and planted to a very conservative rotation, the increases in annual net income to farmers would be in the order of $6.3 million.

Economic Impact of Flooding

The potential value of crop losses from a late spring or fall flood in the four flood zones were estimated from land use maps and crop value data. Under current conditions in those areas the total value of crops that could be destroyed in a severe late spring or fall flood would be in the order of $1.4 million. If the agricultural areas were tile

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* Annual cost of subsidized tile drainage at $42.00/ac., subtracted from gross income.

bassin, les pertes pourraient être aussi élevées que 2,2 millions de dollars.

Conséquences économiques des mesures de conservations du sol et de l'eau

Présentement, nous ne possèdons pas suffisamment de données sûres pour effectuer une analyse de coût-bénéfice des mesures correctives du bassin. Ce travail devrait être effectué quand les études fondamentales seront terminées.

Développement rural

Il peut y avoir de nouvelles conséquences économiques et de développement au palier de la ferme et à celui de l'industrie si l'agriculture dans le bassin saisit les possibilités offertes par les marchés. L'élargissement des cultures commerciales nouvelles ou actuelles pourrait avoir les plus grandes conséquences au cours des cinq prochaines années. Par exemple, la culture de 50 000 acres (20 200 ha) de maïs-grain, de 28 000 acres (11 312 ha) de soya et 2700 acres (1020 ha) de fruits et légumes pourrait rapporter un revenu agricole supplémentaire de 26,2 millions de dollars.

Pour arriver à une telle augmentation de la production, il faudrait faire des investissements à la ferme, élargir les industries connexes, acquérir de nouvelles connaissances et bénéficier d'une variété de services gouvernementaux, surtout pour le financement.

drained to resemble the optimal value situation in the Basin, the loss could range as high as $2.2 million.

Economic Impact of Soil and Water Conservation Measures

At the present time there does not appear to be sufficient good quality data to carry out a benefit/cost analysis of all remedial measures in the Basin. This work should be carried out when the background studies are completed.

Rural Development

There can be substantial new economic and development impacts at the farm level and at the industry level if agriculture in the Basin responds to the market opportunities that are available. Expansion of new and existing cash crops could have the greatest impacts over the next five years. For example, an additional 50,000 acres of grain corn, 28,000 acres of soybeans, and 2,700 acres of fruits and vegetables could generate an additional $26.2 million of farm income.

This kind of production increase would require much new on-farm investment, related industry expansion, new skills, as well as a variety of government services - especially in the area of financing.

AGRICULTURAL COMPONENT BACKGROUND STUDY

STUDY OUTLINE

This Background Study was initiated to describe the agricultural base for two main reasons:

- to identify the opportunities and constraints for agricultural development in the Basin
- to provide agricultural development information for water resource management planning in the Basin.

The Study is divided in two parts. Part 1 deals with the collection and analysis of the facts that describe the nature and scope of agricultural activities in the Basin and adjacent areas. It examines the economic milieu of which agriculture is a major element, the physical base for agriculture and how this base is utilized. Finally, the Study examines the major commodity production systems and how they operate on Basin farms.

Part 2 of the study looks at some of the main options for agricultural development. The implications of this development are discussed in terms of agricultural development opportunities and constraints, and in terms of water management planning.

CHAPTER 1

THE AGRICULTURAL INDUSTRY IN THE BASIN

The South Nation River Basin is one of the most highly productive agricultural areas in Eastern Ontario. It is a mixed farming area with dairy being the major form of enterprise. Cash crops are rapidly gaining in importance, especially grain corn. Many successful farm operations are a combination of several enterprises or "profit centers" that compliment each other in terms of management, labour and capital--such as dairy and cash crops, or beef, hogs, and horticultural crops.

Agriculture in the Basin has a long tradition, going back to early settlement of the area. There are many productive century family farms that used to supply the historic grist mills that remain in Spencerville, Manotick and Alexandria. Livestock breeders and seed growers in the Basin have international reputations for their stock. A major historical note in this regard was the birth of the McIntosh apple at Dundela, which for many decades has been the standard against which other apples in Eastern Canada were measured.

The strength and importance of agriculture is reflected in the processing and manufacturing activities that are carried on in the Basin and surrounding areas. The food and beverage sector is the dominant group and the trend appears to be one of continuing growth.

The dynamics of change are continually at work in both the farming community and the processing and manufacturing industries. While it is often not evident on a day-to-day, or even on a year-to-year basis, it certainly is when looking at what has occurred over the past 10-20 years.

The economic base of any area is classified into three major areas of industrial activity. They are:

(a) Primary -- agriculture, forestry, and other forms of resource extraction
(b) Secondary -- processing and manufacturing
(c) Tertiary -- wholesale, retail, and other service trades

While the main concern of this study is agriculture, it is important to have some perspective on the other forms of economic activity within which the agricultural system is operating. Unfortunately, much of the small area data (county or census division level, or below) for such comparisons is collected only during the ten year census. Therefore data, for example, on wholesale, retail and other service trades are only available for 1971. Processing and manufacturing data are, however, available for five year intervals at the county level.

The comparisons of economic activity in the different processing and manufacturing industry sectors are based on county-level data for 1966, 1971, and 1976. No published data is available at the township level. We are dealing with counties -- part of which are in the Basin, with the rest outside of it. While this approach does not provide a detailed inventory of industrial activity in the Basin, it does provide a good indication of the relative importance of different kinds of activity.

The food and beverage sector has been one of the largest and most important parts of the processing and manufacturing industry in the Basin counties. This sector includes slaughtering and meat processing, dairy products, feed industry, bakeries, confectioneries,

Table 1

Processing and Manufacturing Industries in Basin Counties

Food & Beverage Sector	No. of Est.	1966 Value of Manuf. $ 000	No. of Est.	1971 Value of Manuf. $ 000	No. of Est.	1976 Value of Manuf. $ 000
Slaughtering & Meat Processing	x		x		9	
Dairy Products	59		30		17	
Feed Industry	x		x		22	
Bakeries	x		x		21	
Confectionary Manuf.	x		x		1	
Food Processors	x		x		6	
Soft Drink Manuf.	x		x		5	
Total, F & B	120	122,211	105	206,034	81	504,076
Other Sectors						
Rubber & Plastics	y		4		4	
Textile	8		12		22	
Clothing	3		y		3	
Wood	23		y		21	
Furniture & Fixtures	38		y		21	
Printing & Publishing	12		7		76	
Metal Fabricating	45		55		64	

Table 1 (Continued)

Agricultural Implements	y		y		4	
Other Machinery	y		y		2	
Electrical	12		y		22	
Transport	4		7		3	
Fertilizer	y		y		3	
Chemicals	15		11		10	
Miscellaneous	47		41		35	
Others	216		347		118	
Mineral Products	28		y		20	
Total, Other Sectors	507	742,584	491	901,439	428	1,867,881
Total, All Sectors	627	864,795	596	1,107,473	509	2,371,957

x -- included in total
y -- included in "others"

(Source: Manufacturing Industries of Canada: Sub-Provincial areas 1976, Statistics Canada (31-209)) food processors and soft drinks. From 1966 to 1976 the number of establishments in this sector fell from 120 to 81, and the value of manufactured products rose from about $122 million to more than $500 million (see Table 1). The greatest change occurred in dairy products where the number of establishments dropped from 59 in 1966 to 17 in 1976 as many small butter and cheese factories were closed down. Data for the sectors and industies are incomplete because of the confidentiality problem with small numbers of establishments in some sectors so we have shown the number of establishments where they are avaliable and the total value of the food and beverage sector compared with all other sectors.

The value of manufactured products in the food and beverage in the Basin counties increased by 312% from 1966 to 1976. Over the same period the value of products from all other sectors increased by 152%. Comparing the changes in this sector with the others over time, it is apparent that food and beverages have undergone a rationalization so that fewer firms are producing a higher value of manufactured products, in relation to industries in other sectors:

	1966		1971		1976	
	% of Est.	% of manuf. value	% of Est.	% of manuf. value	% of Est.	% of manuf. value
Food & Beverage Sector	19	14	21	19	19	21

The value of manufactured products per firm increased substantially in the processing and manufacturing industries from 1966 to 1976; however, the increase was much more dramatic in the food and beverage industries after 1971:

	1966	1971	1976
Food and Beverage Sectors	$1 million	$1.96 million	$6.2 million
All Other Sectors	1.5 million	1.5 million	4.4 million

Table 2

Processing & Manufacturing Industries in Basin Counties - 1976

	Ottawa Area		Dundas County		Glengarry Co.		Grenville Co.		Leeds County		Prescott Co.		Stormont Co.		Total, All Counties	
Food & Beverage Sector	No. of Est.	Value of manuf. $ 000	No. of Est.	Value of manuf. $ 000	No. of Est.	Value of manuf. $ 000	No. of Est.	Value of manuf. $ 000	No. of Est.	Value of manuf. $ 000	No. of Est.	Value of manuf. $ 000	No. of Est.	Value of manuf. $ 000	No. of Est.	Value of manuf. $ 000
Slaughtering & Meat Processing	6				1		1		1						9	
Dairy Products	5		2		3		1		3				3		17	
Feed Industry	5		5		3		2				4		3		22	
Bakeries	11				2		1		3		2		2		21	
Confectionary Manuf.	1														1	
Food Processors	1		1				1		2		1				6	
Soft Drink Manuf.	3								1				1		5	
Others																
Total, F & B	32	149,025	8	203,990	9	49,624	6	(not recorded)	10	51,212	7	7,310	9	42,915	81	504,076*
Other Sectors																
Rubber & Plastics	4														4	
Textiles	10										5		7		22	
Clothing													3		3	
Wood	14		3		4										21	
Furniture & Fixtures	21														21	
Printing & Publishing	56						4		6		4		6		76	
Metal Fabricating	43						5		11				5		64	
Machinery									6 (Ag. Imp.-1)						6	
Electrical Products	17								5						22	
Mineral Products	16												4		20	
Transportation									3						3	
Chemicals	5												6		11	
Mixed Fertilizers	1		1										1		3	
Miscellaneous	35														35	
Other	19		9		12		21		15		21 (Ag. Imp.-1)		20 (Ag. Imp.-1)		117	
Total, Other Sectors	241	503,589	13	35,329	16	28,728	30	321,586	46	402,076	21	116,809	52	410,964	428	1,867,881
Total, All Sectors	273	652,614	21	244,217	25	78,352	36	321,586*	56	453,288	37	168,021	61	453,879	509	2,371,957*

* incomplete data

(Source: *Manufacturing* Industries of Canada: Sub-Provincial Areas 1976, Statistics Canada (31-209))

At least part of the change that has occurred in the food and beverage sector is due to the growth of the large firms in the dairy products industry, compared to those in other sectors.

The importance of food and beverage industries in the Basin counties can be seen from Table 2 , which is an expansion of the previous one to show county manufacturing establishment profiles. In three counties - Dundas, Glengarry, and Leeds - the food and beverage sector was larger than all other sectors combined in 1976. Even in the Ottawa area, food and beverages accounted for about 23% of the total value of manufacturing. Compared with the other counties, the proportion of the total value was lowest in Prescott (4%) and Stormont (9%). No data were avaliable on the value of manufactured products in the food and beverage sector in Grenville County.

In addition to food and beverages, several firms in other sectors were active in manufacturing directly related to agriculture. Four firms manufactured agriculture implements and three manufactured mixed fertilizers.

CHAPTER II

SOCIO-ECONOMIC FRAMEWORK

The socio-economic framework of the South River Nation Basin provides the setting within which the agricultural industry operates. The various elements of this industry, as they change and grow, in turn shape the socio-economic framework that they are in. This chapter looks at the recent patterns of population growth and its rural/urban structure, farm production, value and incomes, as well as farm structure.

With the exception of farm structure, where a special Census data tabulation was made, the data are for townships or counties and therfore cover a much larger area than the Basin itself. There are some advantages to this approach. Aside from the more readily available data at the township and county level, this approach puts agriculture in a broader and more realistic setting that can help in understanding some of the relationships within agriculture, as well as between the production system and the markets.

Chapter II is divided into four sections. The major headings are:

1. Population
2. Farm Income
3. Farm Production and Value
4. Farm Structure

1. POPULATION:

Population analysis of the South Nation River was carried out from Census data at the township level. Those townships which lie at least partly within the Basin are all included in this analysis. Therefore, the population figures apply not only to the Basin but also to some of the adjacent areas. The township data are aggregated to the county level in the same way. That is, the counties as identified in this work do not include their townships that lie outside the Basin.

This approach to population study in the Basin results in the inclusion of many people that do not live in the Basin. Townships that are included in this regard are Elizabethtown, Oxford, Gloucester, Cumberland, Alfred, West Hawkesbury, Kenyon and Lochiel.

Total population in the Basin area increased by 46 percent between 1961 and 1976, from more than 130,000 to more than 190,000 (see table 1.1). The population was not only growing over the fifteen years but it was growing faster in each of the successive five year periods.

Looking at the changes in rural and urban populations in the Basin area over the 1961-1976 period, the rural population has grown much more rapidly than the urban population - 56 percent versus 16 percent (Table 1.1). However, the growth in the rural population has come from a 130 percent increase in the number of rural non-farm people, while the number of people living on farms decreased by 54 percent. This change was not unique to the Basin area. It was occurring in most of Ontario , especially within commuting distance of major cities.

In 1961 the farm population was 30 percent of the total area population (Table 1.1). By 1976 it was only 9 percent. This reflected both the real decline in the number of people living on farms and the population growth among urban and rural non-farm people. Over the same

TABLE 1.1

Population Summary of Basin Area Townships

Population Structure *	1961	1966	1971	1976
Farm	38,485	36,504	27,020	17,616
% of total	30	27	17	9
% change over 1961	100	95	70	46
Rural non-farm	57,468	62,852	90,765	132,455
% of total	44	46	58	70
% change over 1961	100	109	158	230
Rural total	95,953	99,356	117,785	150,071
% of total	74	73	75	79
% change over 1961	100	104	123	156
Urban	34,544	37,592	38,947	40,100
% of total	26	27	25	21
% change over 1961	100	109	113	116
Total population	130,497	136,948	156,732	190,171
% of total	100	100	100	100
% change over 1961	100	105	120	146

* Refer to Appendix A for information concerning definitions.

Population figures for individual Basin townships and counties are included in Appendix A.

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period the rural non-farm group which includes rural villages and hamlets; increased from 44 percent of the total in 1961 to 70 percent in 1976. While the actual number of urban residents in the Basin area increased from 34,544 to 40,100 over that period, the percentage of urban people in the total population fell from 26 percent to 21 percent.

The population changes in the Basin area have created an interesting situation. There are proportionately more rural residents and fewer urban residents in 1976 (79/20) than in 1961 (74/26). The proportion of urban residents to the total actually peaked in 1966 before the number of farm residents began to decline sharply and the number of rural non-farm people began to increase so dramatically (see Table 1.2). Figures for individual Basin townships and counties are shown in Appendix A.

Table 1.2

Population Projections for Basin Area Townships

Modified TEIGA Projections

	Basin Counties	Basin Townships				
Year	Total [1]	Total [2]	Urban [3]	Rural [3]	Non-Farm [4]	Farm [4]
1961	565,100	130,497	34,544	95,953	57,468	38,485
1966		136,948	37,592	99,356	62,852	36,504
1971	687,600	156,732	38,947	117,785	90,852	27,020
1976		190,171	40,100	150,071	132,455	17,616
1986	881,400	202,700	40,500	162,150	149,150	13,000
2001	1,051,900	241,900	43,500	198,400	188,500	9,900

Notes:

1. TEIGA Projections by County: Component Method
2. Component of TEIGA: Total Counties X 23% = Basin Townships
3. Share Method: Twps. X 20% = Urban for 1986
   Twps. X 18% = Urban for 2001
4. Share Method: Rural X 8% = Farm for 1986
   Rural X 5% = Farm for 2001

Source: Ontario's Changing Population Volume II, Directions and
Impact of Future Change 1971-2001.
TEIGA, March 1976

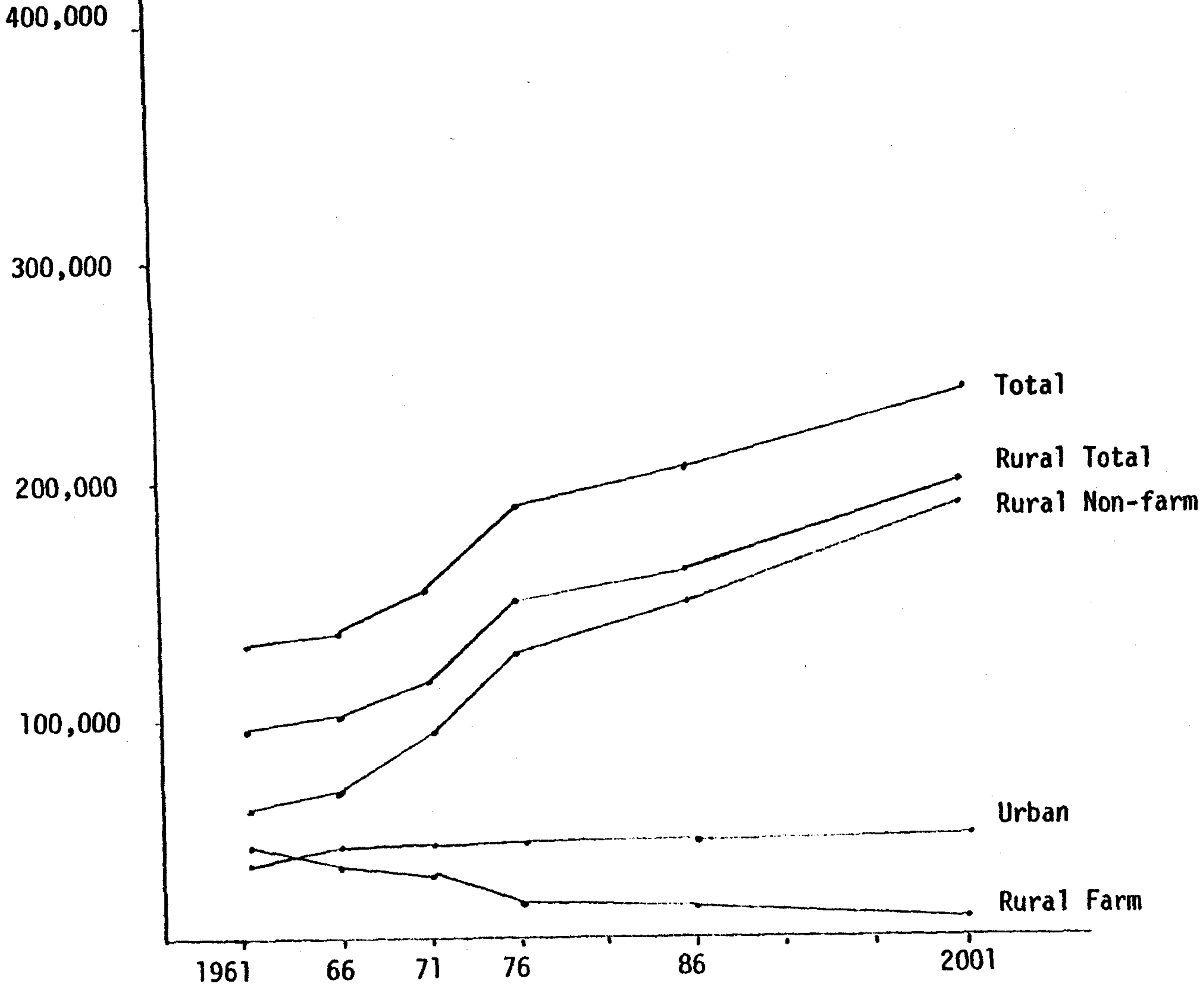
Population projections for the Basin townships have been made by modifying standard TEIGA projectons for county populations. Table 1.2 presents the actual figures for 1961 to 1976 and projected figures for 1986 and 2001. As well, they are graphically displayed on Figure 1.

The projections prepared by TEIGA are based on the component method, where-by each county is determined to be a component of the total

Figure 1

Population Trends

For Basin Area Townships 1961-2001



population for Ontario. Similarily, it was determined that each township was a component of its county. The Basin township total is a summation of the township components and accounts for approximately 23% of the county total figures. It was therefore considered that the total of the county projections, 881,400 in 1986 and 1,051,900 in 2001, could be multiplied by 23% to determine the Basin township projections.

The division of the Basin township totals into urban, rural, non-farm and farm was done using the share method of calculation. The shares were determined by approximation for continuation of past trends, as follows.

	Urban	Rural	Non-Farm	Farm
1961	26% of total	74% of total	60% of Rural	40% of Rural
1966	27%	73%	63%	37%
1971	25%	75%	63%	23%
1976	21%	79%	88%	12%
1986	20%	80%	92%	8%
2001	18%	82%	95%	5%

The urban population is projected to increase by 28 percent over the 1976-2001 period (Table 1.2, Figure 1), which appears to be a reasonable rate of increase, given the increasing proportion of older people in our society and the likelihood that they will want to live in urban areas with good access to services. Increases or decreases in both the urban and rural non-farm sector of the population are dependant on the levels of economic growth and job opportunities available.

The farm population is projected to continue dropping to 2001 as the farms become larger and fewer in number. The 2001 farm population in the Basin area is projected to be less than 10,000 people, a drop of 44 percent over the 1976 level of nearly 7,700 people. Many factors will influence the rate of change in the future farm population - both inside and outside agriculture. However, this kind of projection is generally in keeping with what has already happened in the United States where currently the farm population is about 5% of the total. In our projection this situation occurs in 2001 in the Basin area.

Since a great deal of farm consolidation has already occurred in the Basin townships, we do not expect the pace to continue at the same rate between now and 2001. Depending on government agricultural policies, it would be more reasonable to expect the farm population to stabilize around the 10-15,000 level in the early 1990's.

2. FARM INCOME:

Farm income was analysed at the county level, based on a special compilation of a sample of farm tax-filer data prepared by Statistics Canada.* Net farm income, off-farm income and total income were analysed for the eleven-year period from 1967 to 1977 for the Province and for each of the counties in the Basin. The averages were tabulated for comparison here and the eleven-year income profile is shown graphically for each county and the Province (see Table 2.1 below).

Over the 1967-1977 period at the provincial level net farm income averaged 24.7% of total farm income for tax-filers and off-farm income averaged 75.3%. Among Basin counties net farm income ranged from a low of 7.3% of total farm income in Ottawa/Carleton to a high of 44.6% in Glengarry. Table 2.1 shows that four of the counties had net farm incomes lower than the provincial level and four were higher.

Table 2.1

Average Farm Income, Province and Basin Counties, 1967-1977

	Net Farm Income	Off-Farm Income	Total Income
Province	$1845	$5618	$7462
Ottawa/ Carelton	506	6362	6868
Dundas	2147	3750	5897
Glengarry	2175	2702	4877
Grenville	676	4991	5667
Leeds	1272	4252	5544
Prescott	2357	3312	5669

Table 2.1 (Continued)

Russel	2294	3534	5828
Stormont	1688	4047	5735

*See "Explanation of Sample" and "Definitions" at the end of this section

Ottawa/Carelton was the only area where off-farm income exceeded the provincial level over the eleven-year period. In terms of total income, none of the Basin counties showed total incomes as high as the provincial level.

The highest net farm income from 1967-1977 was in Prescott county, followed closely by Russell, then Glengarry and Dundas counties (see Table 2.1). However, total farm income was highest in Dundas, followed by Prescott and Stormont. The lowest total income was in Glengarry, which probably reflects a lack of off-farm income opportunities compared to other counties.

The historical patterns of net farm income, off-farm income and total income over the 1967-1977 period are shown graphically on the accompanying charts. Chart 1. shows the pattern on the provincial level. Net farm income remained relatively constant from 1967 to 1971, around the $1200 level. Net farm increased sharply in 1972, 1973 and peaked in 1974 just over $3000. It began dropping in 1975 and by 1977 it was about $2100.

In the meantime, off-farm income increased continuously every year from 1967 through 1977, as did total income. The provincial level of off-farm income in 1967 was about $2600 and by 1977 this amount had more than doubled to over $5600.

Farm income patterns for the Basin counties are shown graphically on Charts 2.-9. The patterns are similar to each other and to that of the Province in two general aspects:

(a) Total farm income increased substantially between 1967 and 1977 because off-farm income was rising rapidly.
(b) Net farm income varied from county to county and year to year.

In Chart 2. for Ottawa/Carleton the low level of net farm income emphasizes the importance of off-farm income in that area. This is especially evident in 1970 when net farm income averaged only $80 and in 1974 when net farm income showed a loss of $263. In the latter instance total income was then less than off-farm income because of the loss. Off-farm income was less important in Dundas county where net farm income is a major part of the total income (see Chart 3.). While net farm income dropped for two successive years in 1976-1977, the rate of increase in off-farm income was more than sufficient to make up the difference and total income continued to rise.

The income pattern in Glengarry differs from the previous two areas before 1974 (see Chart 4.). From 1967 to 1974 net farm income and off-farm income made up similar proportions of the total income, varying from time to time as to which one was the larger of the two. Since 1974 off-farm income has become the distinctly larger portion of the total income. The pattern in Chart 5. for Grenville county is similar to Ottawa/Carleton in that off-farm income is the major source of total income. One would expect that a large proportion of these tax filers were part-time farmers.

Net farm income in Leeds county showed more stability than these discussed previously (see Chart 6.). While it was not generally as high as Dundas, it was generally more even from year to year.

The farm income pattern in Chart 7. for Prescott county shows that from 1968 through 1973 net farm income was the largest portion of total income. From 1974 through 1977 the income pattern followed that of the other areas as off-farm income rose quickly. Chart 8. for Russell shows a strong growth pattern for net farm income that continued generally upward from 1970 through 1977, at which time it was the highest one recorded here ($4085). While off-farm income rose as well, it did not rise as quickly in Russell as in the other counties, nor did it become such a major proportion of the total income. Chart 9. Shows that off-farm income was a major contributor to the total income during the eleven year period. Off-farm income began to take on even more importance as of 1975 when it continued to rise as net farm income levelled out.

Some of the implications of income for farmers from off-farm work were examined by Bollman in his study of operators entering and leaving farming. He concluded that income from off-farm work makes entry to farming easier and slows down the movement of people out of farming (this does not apply to large scale capital intensive operations). Generally, Bollman sees the substitution of off-farm work for farm work as a part of the process of adjusting human resources from the farm sector to other sectors of the economy.

In an examination of current trends in Canadian farm income the Canadian Bankers' Association made some observations about sources of off-farm income. The sources include:

- salaries and wages	66%
- non-farm self employment	7%
- investment income	14%
- government transfer payments	11%
- other sources	2%

They also observed that farm families who reported some farm income, earned two thirds of their income from off-farm sources in 1977 and 1978, which was much higher than 1972-1976. CBA expects that off-farm income will continue to be a major portion of total farm income in the future.

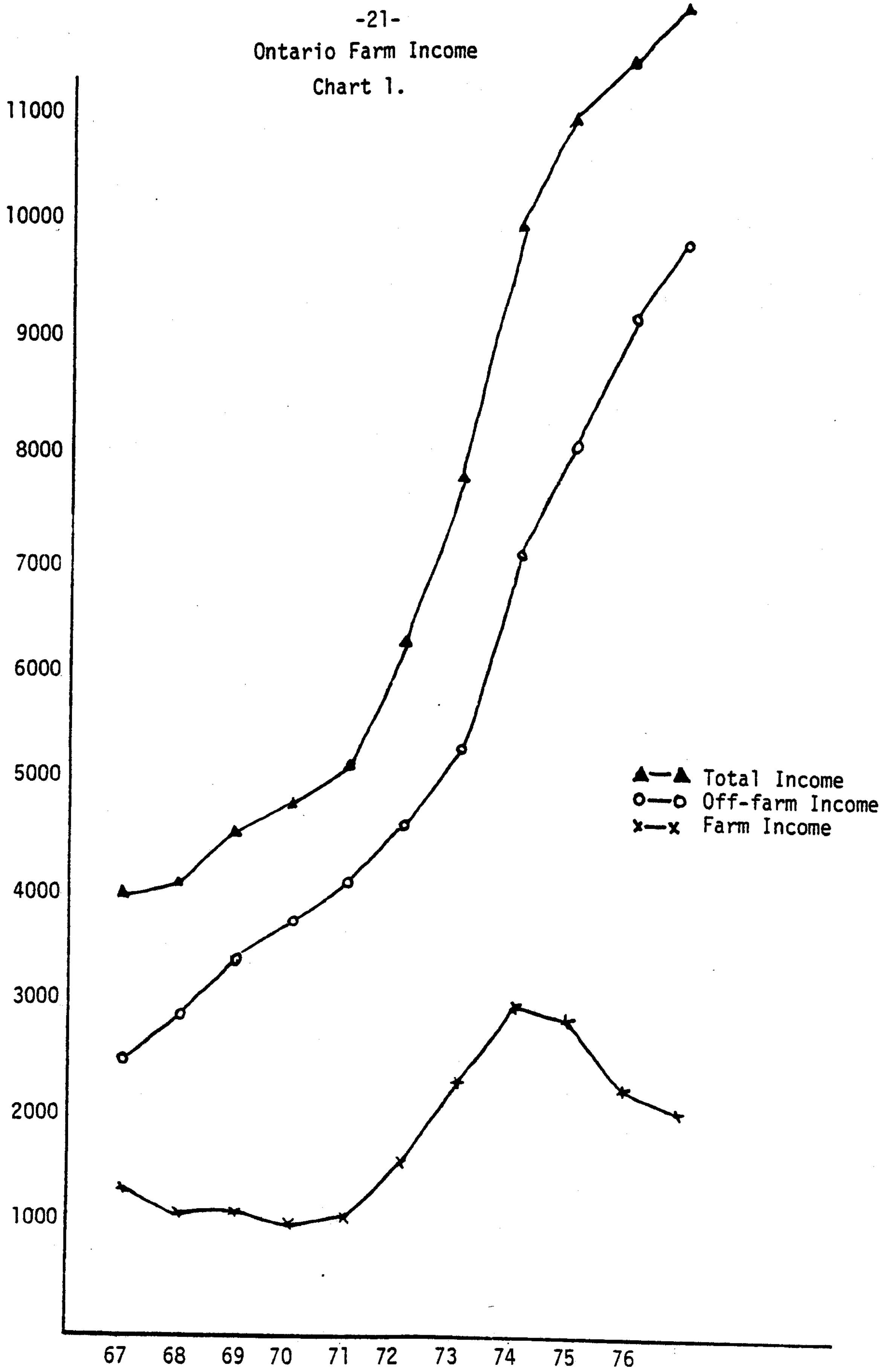
Explanation of Sample: This is a 10% Longitudinal Sample of Farm Taxfilers. The sample is based on Social Insurance Numbers of Taxfilers. Only 1.2% and 0.6% farm taxfilers in 1971 and 1976 respectively, did not report a S.I.N. Therefore sample is a good representative of census division.

Definitions:

1. Net Farm Income: Net (unincorporated) self-employment income from farming.
2. Total Income: Sum of following: Net farm, salary and wages, Net business, Net professional, Net commission, Net fishing, Net non-farm self-employment, Net rental, interest and investments, old age security and/or Canada pension income, family allowance, unemployment benefits, alimony received, others.
3. Total Off-Farm Income: Total income minus Net farm income.

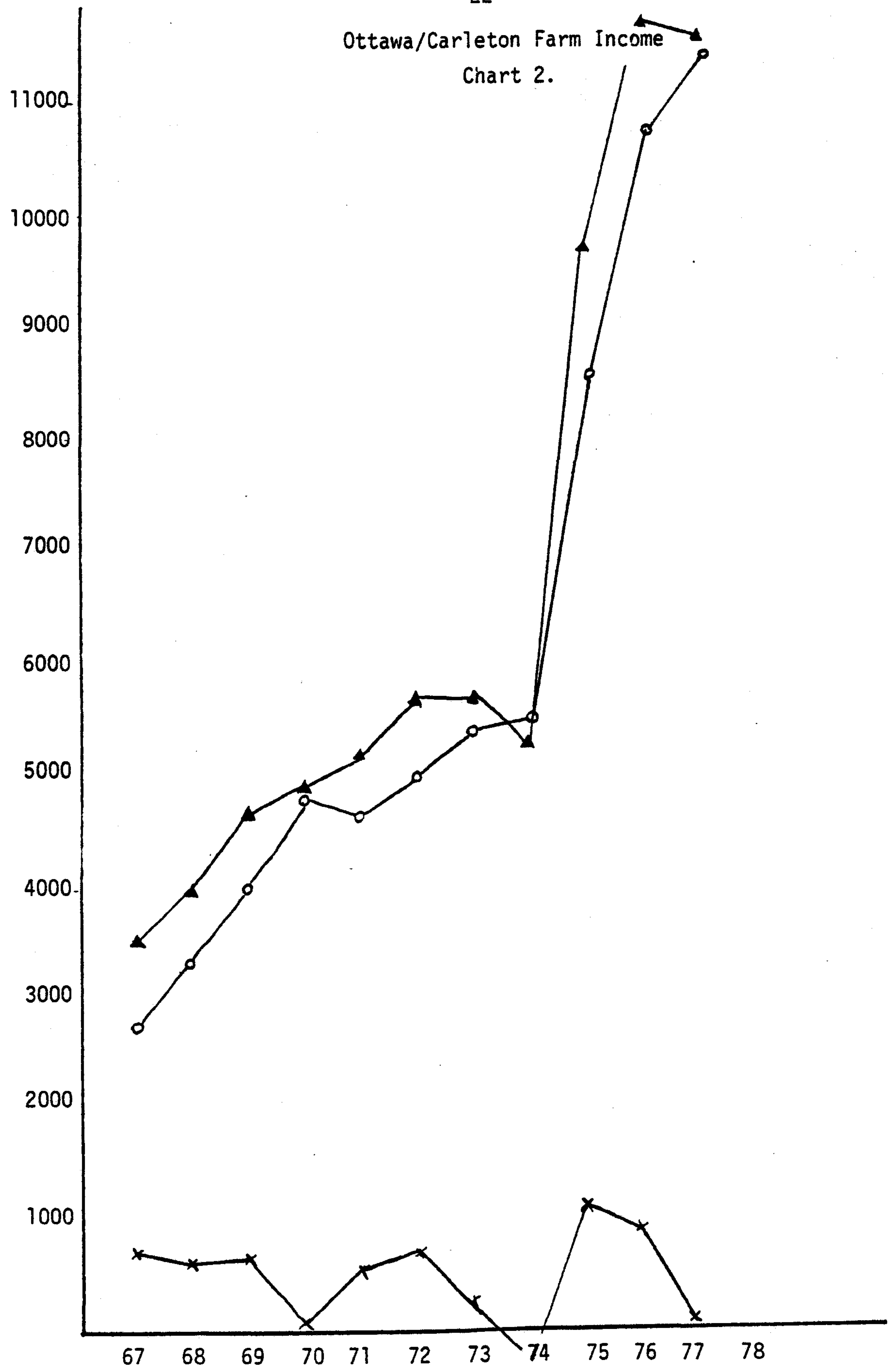
Ontario Farm Income

Chart 1.



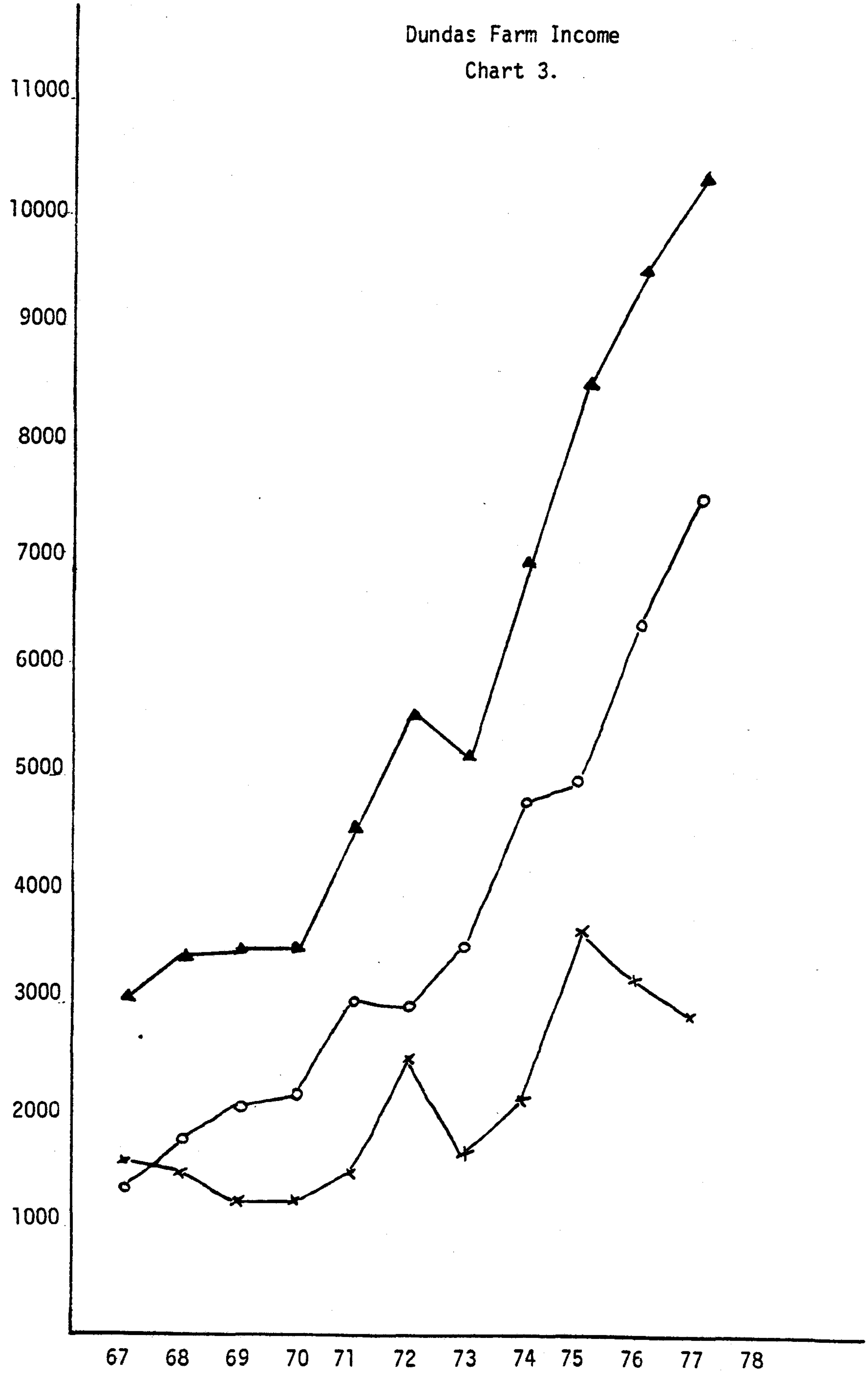
Ottawa/Carleton Farm Income

Chart 2.



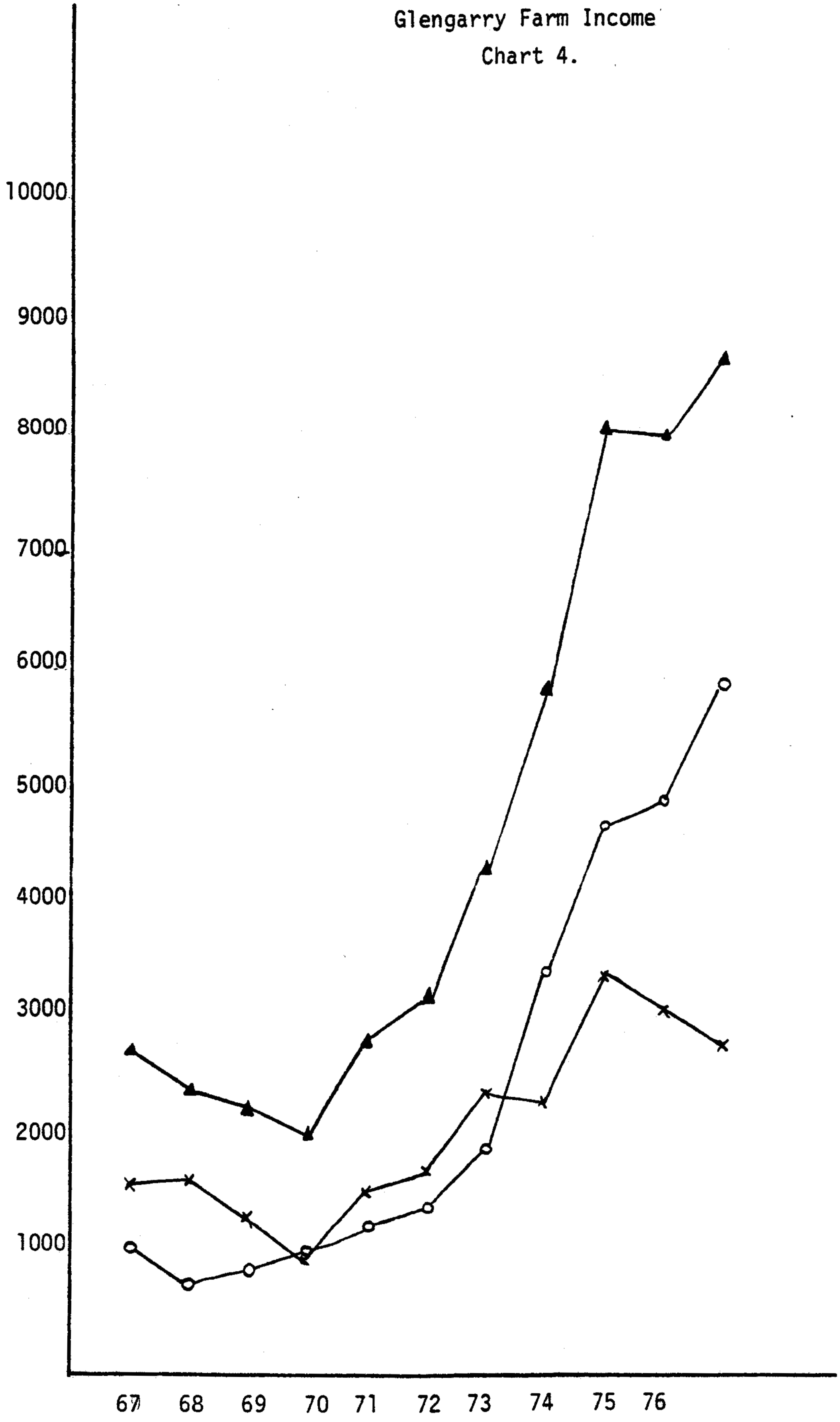
Dundas Farm Income

Chart 3.



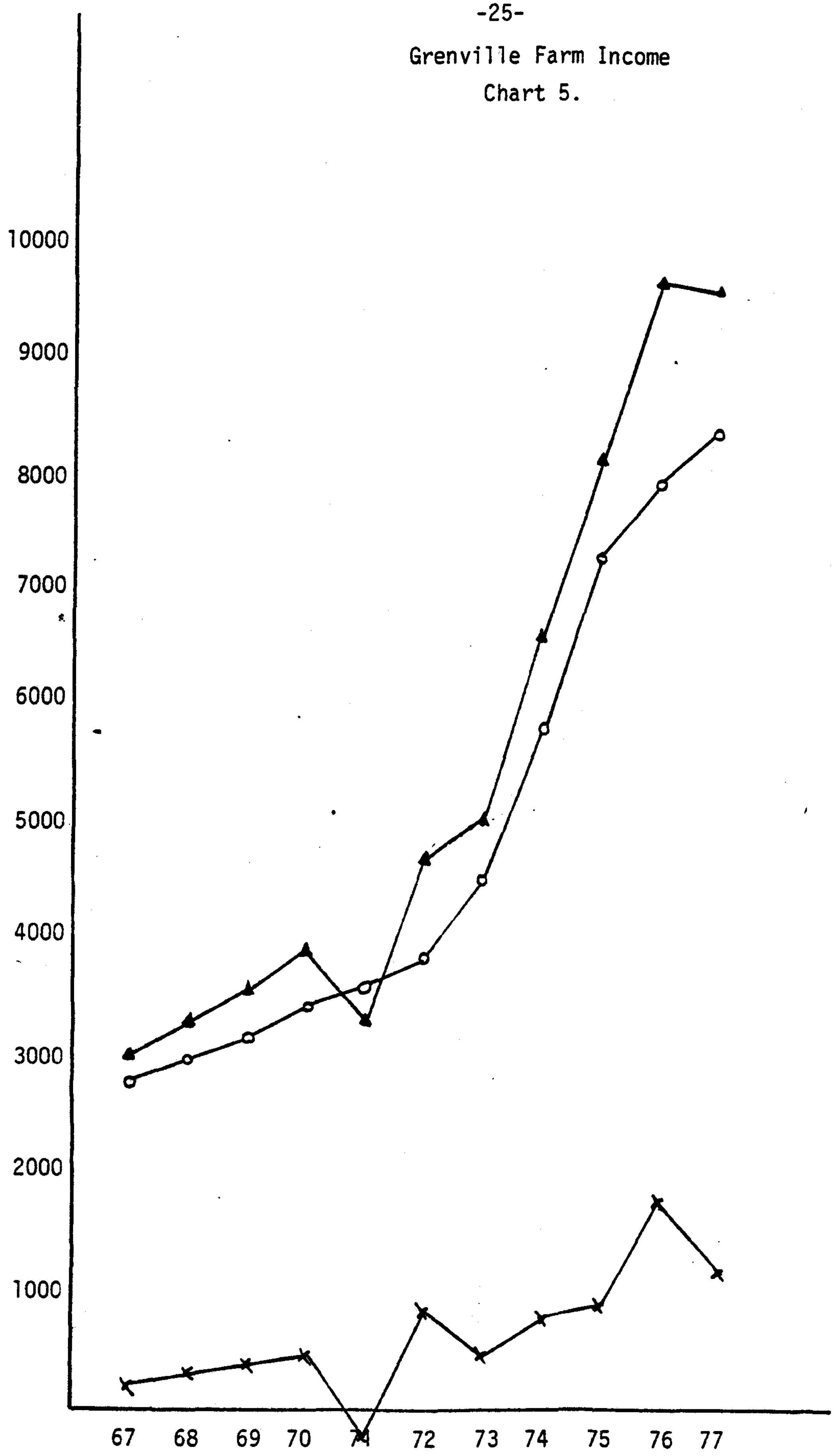
Glengarry Farm Income

Chart 4.



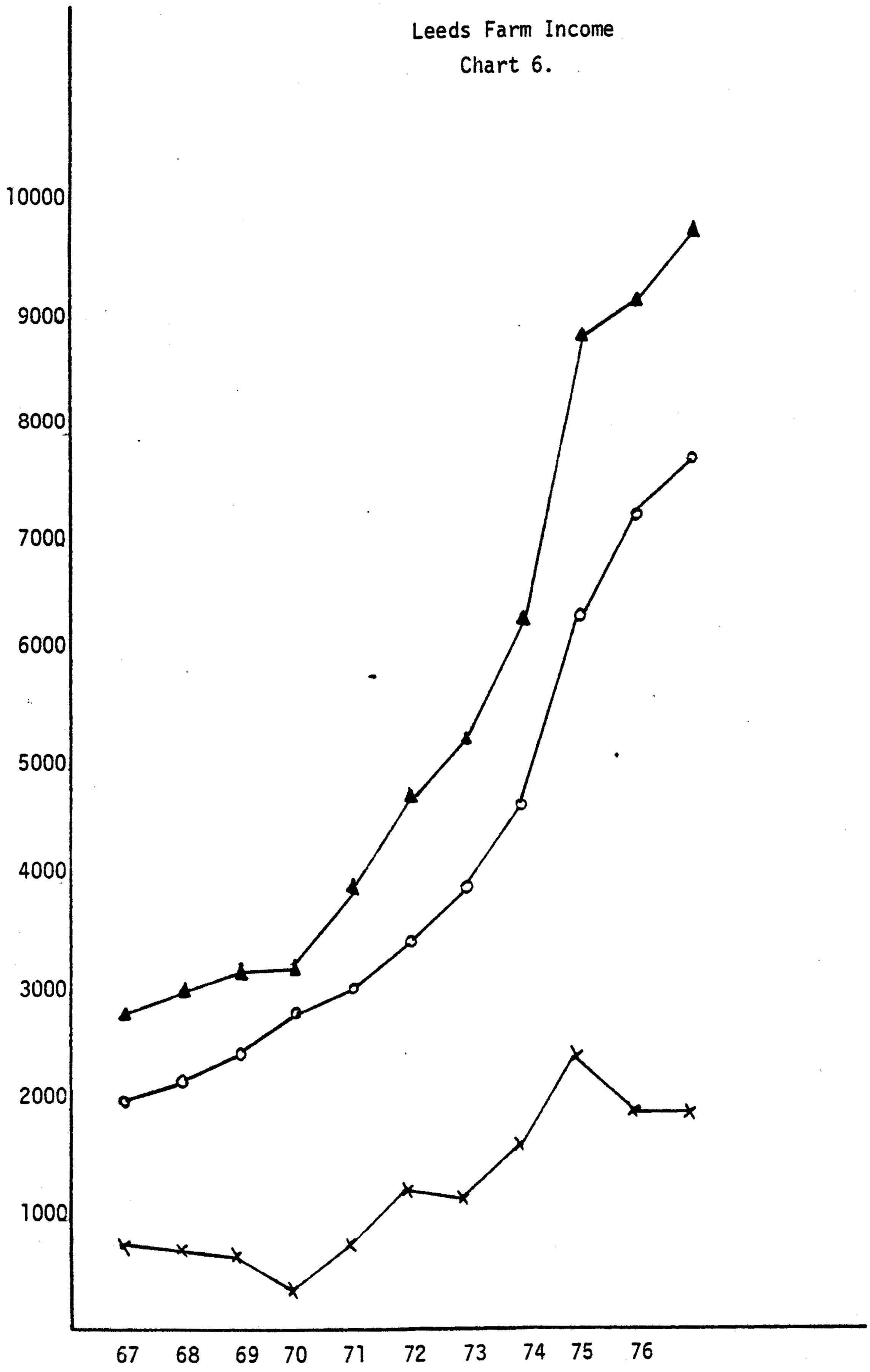
Grenville Farm Income

Chart 5.



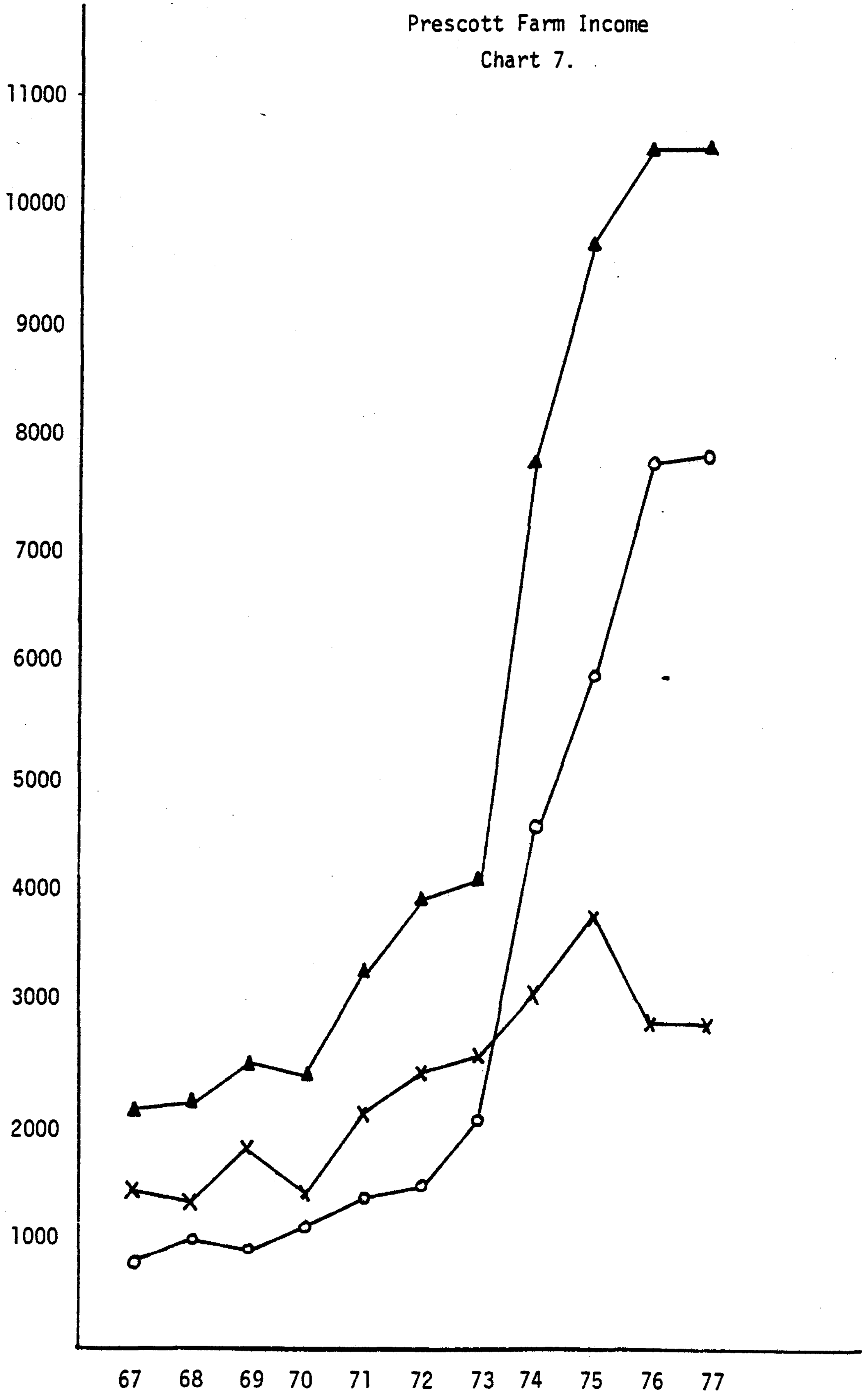
Leeds Farm Income

Chart 6.



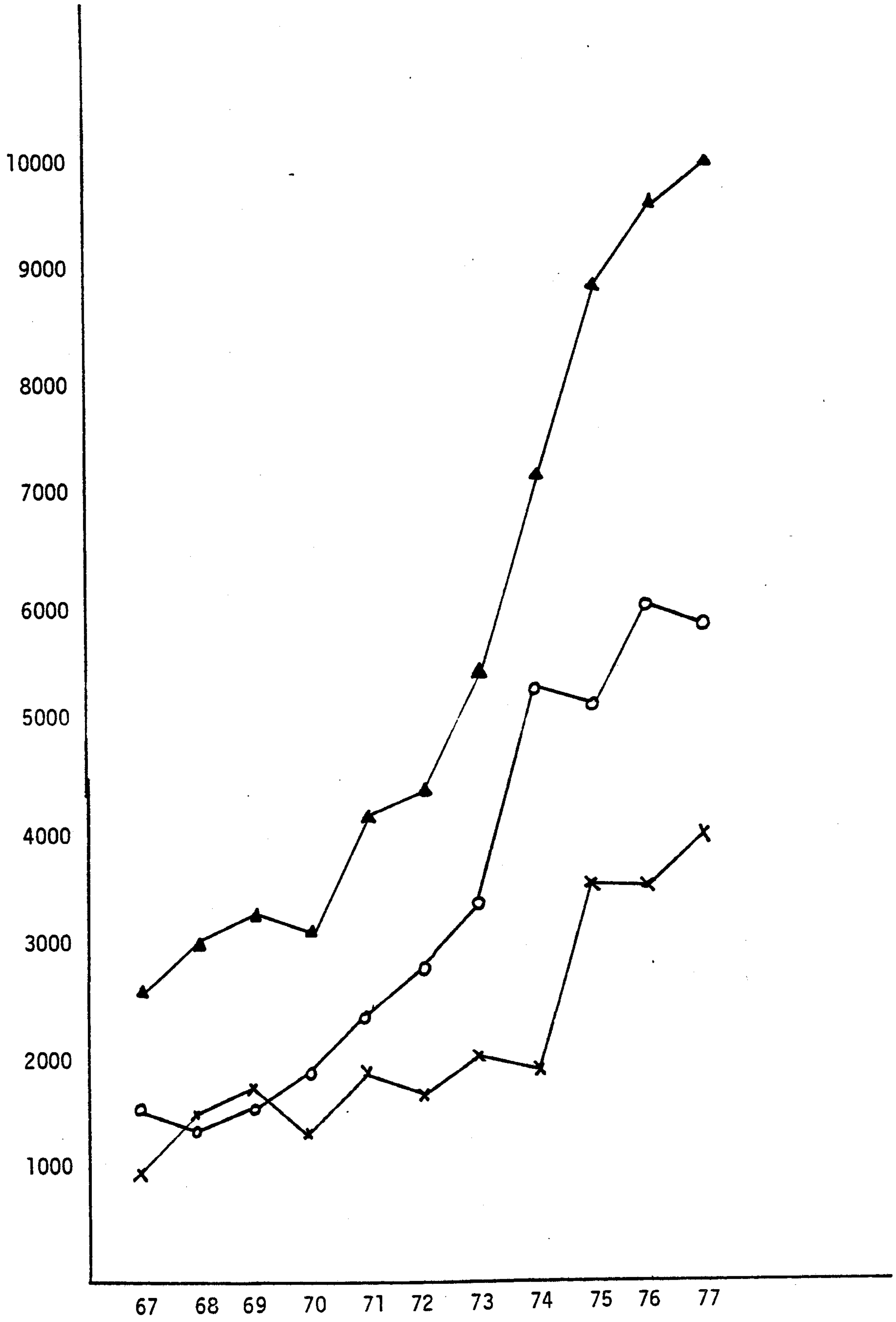
Prescott Farm Income

Chart 7.



Russell Farm Income

Chart 8.



Stormont Farm Income

Chart 9.

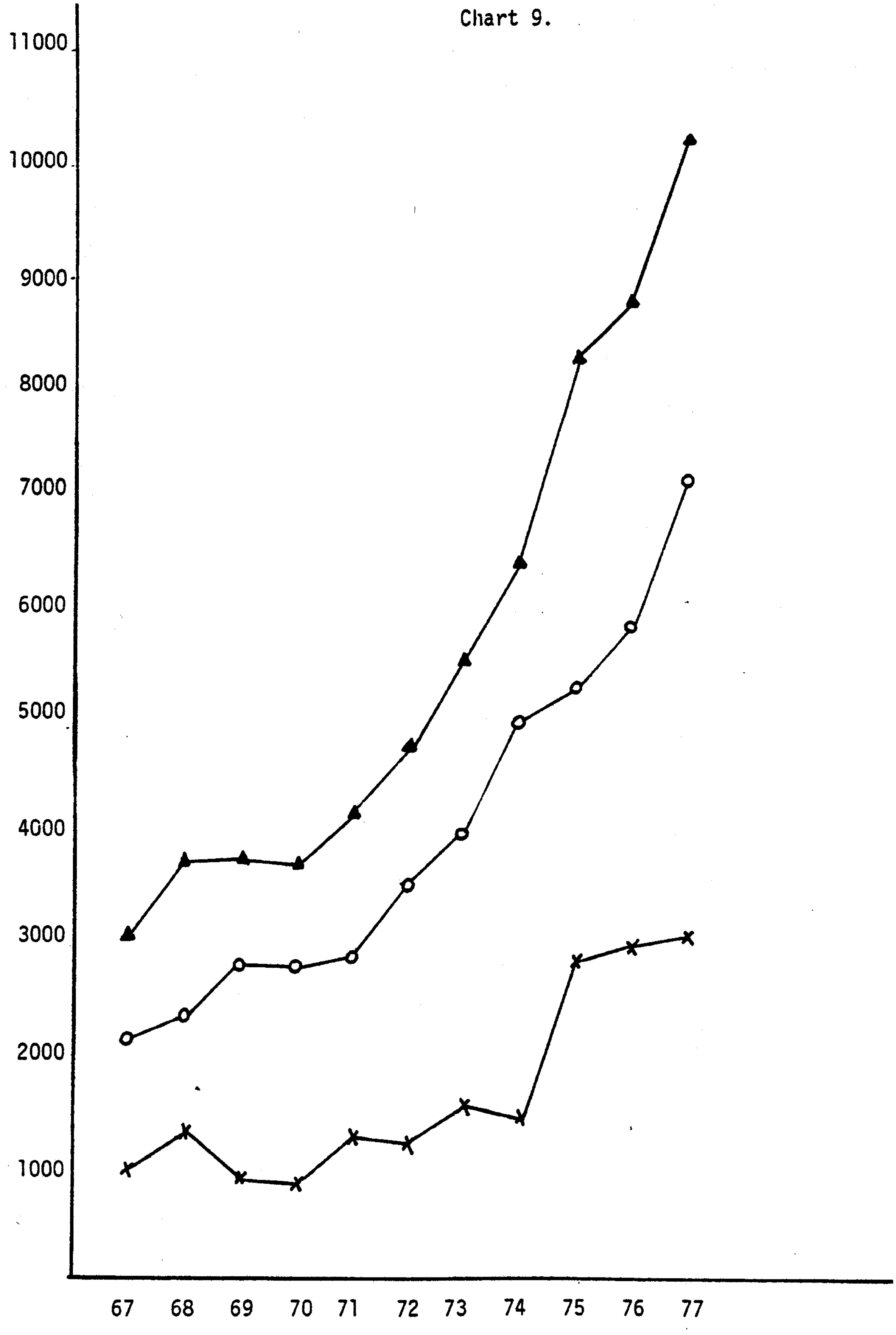


TABLE 2.2

Average Farm Income, Ontario, 1967-1977

Year	Sample of Taxfilers	Farm Net $	Off Farm Income $	Total Income $
1967	993,350	1436	2,599	4,035
1968	102,750	1156	2,952	4,108
1969	103,600	1157	3,467	4,624
1970	102,800	1047	3,785	4,832
1971	101,850	1070	4,158	5,228
1972	101,200	1622	4,658	6,280
1973	102,650	2396	5,395	7,791
1974	103,550	3016	7,073	10,089
1975	103,550	2917	8,126	11,043
1976	105,550	2336	9,236	11,572
1977	106,350	2096	9,953	12,049
Total	1,129,700	1,845	5,618	7,462

(Source: Taxfiler Statistics, Ontario 1967-1977, Statistics Canada (Special Compilation))

TABLE 2.3

Average Farm Income, Basin Counties, 1967-1977

Year	Sample of Taxfilers	Farm Net $	Off Farm Income $	Total Income $	Sample of Taxfilers	Farm Net $	Off Farm Income $	Total Income $	Sample of Taxfilers	Farm Net $	Off Farm Income $	Total Income $	Sample of Taxfilers	Farm Net $	Off Farm Income $	Total Income $
		Ottawa/Carleton				Dundas				Leeds				Prescott		
1967	1050	721	2763	3484	1000	1641	1418	3059	1150	829	2061	2890	550	1377	769	2146
1968	1150	639	3354	3993	1050	1560	1885	3445	1250	769	2253	3022	750	1330	913	2244
1969	1300	654	3998	4653	1100	1335	2139	3474	1130	704	2535	3239	850	1760	836	2585
1970	1200	80	4843	4923	1100	1281	2261	3543	1250	368	2895	3265	850	1382	1088	2470
1971	1150	553	4664	5217	1050	1538	3071	4609	1300	827	3175	4002	850	2050	1302	3353
1972	1100	730	5004	5734	1050	2548	3065	5614	1300	1306	3542	4849	850	2404	1491	3895
1973	1200	257	5470	5727	950	1688	3567	5255	1300	1225	4077	5302	850	2559	2055	4615
1974	1200	-263	7570	7307	1000	2191	4792	6983	1200	1723	4682	6402	900	3177	4595	7772
1975	1200	1138	8599	9736	1000	3670	4924	8594	1150	2515	6460	8974	900	3713	5973	9686
1976	1300	964	10779	11742	1100	3233	6367	9599	1300	2041	7321	9362	900	2802	7740	10542
1977	1300	151	11496	11646	1100	2934	7532	10466	1250	1998	7856	9854	900	2790	7799	10589
Total	13150	506	6362	6860	11500	2147	3750	5897	13750	1292	4252	5544	9200	2357	3312	5669
		Glengarry				Grenville				Russell				Stormont		
1967	600	1643	1136	2779	600	248	2821	3069	700	1036	1602	2638	650	1003	2166	3170
1968	950	1691	795	2487	750	323	3051	3375	850	1583	1421	3004	650	1341	2439	3780
1969	1150	1371	931	2302	850	417	3204	3621	1000	1747	1541	3339	850	923	2856	3779
1970	1100	996	1083	2079	800	497	3483	3980	1050	1351	1835	3186	800	874	2851	3725
1971	1100	1580	1317	2898	850	-238	3604	3366	1000	1777	2380	4157	750	1272	2916	4188
1972	1050	1739	1495	3234	900	875	3850	4726	1050	1683	2800	4482	800	1214	3577	4791
1973	1100	2410	1912	4322	850	498	4524	5022	1000	2094	3385	5479	750	1548	4023	5571
1974	1200	2364	3450	5815	850	790	5837	6628	1000	1909	5298	7207	700	1483	5002	6485
1975	1300	3398	4693	8090	850	852	7270	8172	1150	3577	5187	8763	750	2882	5381	8263
1976	1300	3143	4920	8064	900	1792	7899	9691	1150	3563	6057	9620	800	2930	5851	8781
1977	1750	2824	5878	8702	900	1187	8371	9558	1050	4085	5890	9975	800	3045	7170	10214
Total	12200	2175	2702	4877	9100	676	4991	5667	10950	2294	3534	5828	8200	1688	4047	5735

3. FARM PRODUCTION:

The volume and value of farm production are discussed briefly below to show the trends that have been occuring in the Basin since 1961. This section provides a background for more detailed discussion of livestock systems and commodities to follow in Chapter 4.

3.1 Volume of Farm Production

While farmers in the Basin counties produce a wide range of commodities, there have been many changes in the production pattern since 1961. Table 3.1 lists the production by commodity for the years 1961, 1966, 1971, 1976 and 1979. Data are available of the fruit and vegetable crops in 1976 and 1979 only because of improved statistical reporting systems at the provincial level.

Spring and winter wheat were grown in the Basin counties during the 60's and early 70's; however, no acreage was recorded in 1979. Since then a few farmers are looking at wheat again, particularly winter wheat, because it represents another cash crop in the rotation and can be harvested early in the fall during the good weather.

During the 1960's oats were widely grown and represented the largest cereal crop in the Basin counties. Production was in the 10 million bushel range and it has since declined to the 3-4 million bushel range as other crops became more profitable to grow.

Barley production increased seven fold to 175,700 bu. in 1961 to nearly 1.3 million bu. in 1979. Table 3.1 indicates that production rose and through a considerable range during the interval between 1961 and 1979. New higher yielding varieties and good feed value and rising prices have made barley a more attractive crop to grow in the Basin than it was previously.

Annual production between 1-2.4 million bu. of mixed grain. From 1961 and 1979 reflects the continuing importance of mixed oats and barley as a home-grown livestock feed. While some management specialists believe that farmers should produce higher value crops than mixed grain, there are some distinct advantages from the grower's point of view. This is a relatively safe crop during periods of uncertain weather, The mix of two cereals appears to reduce the risk of disease as well. Also, the grain is harvested already mixed and can be ground and fed easily on the farm.

Grain corn production increased spectacularily in the Basin counties between 1961 and 1979. From 189,000 bu. in 1961 corn production rose to nearly 5.8 million bu. ten years later. By 1979 it had further increased to 8.3 million bu., making corn the largest and most important cash crop in the Basin area. This rate of increase was made possible by the availability of early maturing, high yielding varieties, and the installation of tile drains. The bulk of grain corn production goes into livestock feed.

Production of fodder or silage corn increased from some 370,000 tons in 1961 to a level between 1.2 and 1.5 million tons during the 1971-1979 period, reflecting the consolidations and capital intensive development of dairy farms in the Basin area. As with grain corn, new silage corn varieties and land drainage were major factors in enabling the increase in production.

Table 3.1

Volume of Farm Production Summary for Basin Counties

Commodity	Unit	1961	1966	1971	1976	1979
Field Crops:						
Spring Wheat	bu	77,200	79,800			
Winter Wheat	bu	82,900	43,900	50,500	46,000	
Oats	bu	10,260,400	11,194,500	6,114,600	3,122,000	4,371,000
Barley	bu	175,700	439,500	683,800	363,000	1,258,000
Mixed Grain	bu	1,078,000	1,217,300	2,144,700	1,145,000	2,403,000
Corn: Grain	bu	189,400	551,600	5,759,400	4,987,000	8,296,000
Corn: Fodder	tons	370,200	824,300	1,213,500	1,539,000	1,279,000
Hay	tons	1,199,400	1,192,700	1,029,100	1,068,000	1,218,000
Livestock:						
Cattle	#	42,973	43,819	76,189	58,348	35,119
Calves	#	N/A	70,237	73,409	57,216	50,119
Hogs	#	19,070	81,749	79,517	33,307	84,764
Sheep	#	21,255	17,514	15,038	2,175	3,940
Milk	lbs	200,872,289	222,484,046	1,104,953,000	1,060,985,000	1,076,565,009
Poultry:						
Eggs	doz	10,794,378	17,799,485	28,701,660	22,027,060	22,924,320
Meat Birds	#	102,185	71,251	146,846	197,247	N/A
Fruits & Vegetables:						
Apples	lbs	N/A	N/A	N/A	2,988,000	5,313,000

Table 3.1 (Continued)

Commodity	Unit	1961	1966	1971	1976	1979
Small Fruit	qt	N/A	N/A	N/A	295,000	5,313,000
Corn	lbs	N/A	N/A	N/A	1,866,000	3,576,000
Potatoes	lbs	N/A	N/A	38,392,500	29,556,000	29,643,000
Tomatoes	lbs	N/A	N/A	N/A	3,211,000	1,231,000
Cabbage	lbs	N/A	N/A	N/A	2,910,000	2,768,000
Others	lbs	N/A	N/A	N/A	7,031,000	5,287,000

(Source: Census of Agriculture, Ontario and Agricultural Statistics for Ontario, 1979)

The hay crop in the Basin counties is the only one of the major field crops where the level of production has remained virtually unchanged from 1961 through 1979 at 1-1.2 million tons. It has always been the mainstay cattle feed in Eastern Ontario, and in times of surplus is exported to United States and other parts of Ontario. What is not evident from Table 3.1 is the changes that have occured over this time period in hay production systems, yield, and quality now from a feed standpoint and the production is being maintained over substantially fewer areas.

Total livestock numbers fluctuate considerably as beef and swine herds are built up or sold off during the swings in the beef and hog cycles. Dairy cattle numbers change much more slowly because of the stability in that industry.

Livestock numbers peaked in the Basin counties around 1971 after a rapid build-up of herds during the 60's, with the exception of the sheep flock which decreased by 90%,1961 through 1976. From 1971 to 1979 cattle numbersdropped by more than 50% from 76,189 head to just over 35,000. The number of calves in 1979 were 31% below the 1971 level. Hog numbers have fluctuated between the 1961 low of some 18,000 to the 1979 high of almost 85,000. There was a very rapid build up in the swine head in the 60's to around 80,000 head, dropping back to around 33,000 in 1976 before climbing to the 1979 high. The expansion of grain corn products in Eastern Ontario has been a major factor, in addition to pork prices, in the rise of hog numbers in Basin counties.

While the Basin county sheep flock was reduced drastically by 1976, it began increasing again as the local markets for lamb and wool gained strength.

Milk is the single most important farm commodity in the Basin counties. Production rose from just over 200 million lbs. in 1961 to 1.1 billion lbs. in 1971. The level of production has remained relativley constant since that time at just over the 1 billion lbs. level.

These levels of production have been achieved and maintained in spite of a decline in the number of dairy farms. The farms have become larger, with larger cow herds, and higher milk production per cow.

Egg production more than doubled in the Basin counties from 1961 to 1971. From 10.8 million dozen in 1961, egg output rose to a peak of 28.8 million dozen in 1971. Since that time production has settled back to 22.9 million dozen where it remained through 1979.

The production of meat birds is relativley low because of the lack of area slaughter facilities. Meat bird output went from a low of just 71,000 birds in 1966 to more than 197,00 ten years later. No figures were available for 1979.

Good data for fruit and vegetable production trends in Basin counties were not available before the early 1970's. Census data are available showing fruit and vegetable production, but commodities are not identified. Over the 1976-1979 period fruit production increased substantially, but from a relatively small base. The largest fruit crop was apples which have been traditionally important in the Basin area. Production increased from about 3 million pounds to more than 5.3 million. Small fruit production more than tripled in the period, from 295,000 quarts to 935,000. Much of the increase was in the form of pick-your-own strawberries.

With the exception of sweet corn, production of other major vegetable crops decreased in the Basin counties from 1976 to 1979. the sweet corn acreage doubled in that period, reflecting demand at roadside stands and pick-your-own operations. From 1971 to 1979 potato production decreased by nearly 10 million pounds as growers switched to other more profitable crops. Several counties did not record any commercial potato production in 1979, and 88% of the total production in the Basin counties was in Prescott.

Tomatoes, cabbage and other vegetables also showed lower production in 1979 then 1976; however it is not clear whether this is part of a trend or a reflection of other factors, including lower yields.

3.2 Value of Farm Production

The value of farm production in the Basin counties increased from about $53.7 million in 1961 to more than $170 million in 1976, which is a three-fold increase in value (see Table 3.2). While the value of production increased in all of the counties, it was more dramatic in some than in others. In Dundas county the increase factor was 5.2, followed by Prescott with 3.7 and Glenagarry with 3.4.

Within the 1961-1976 period the pattern of increasing value of farm production shows a steady upward trend from 1961 through 1971. Then, from 1971 through 1976 the value of production doubled. Given this kind of production base and reasonable prices it is likely that the upward trend will continue, but at a rate below the 1971-1976 period.

Table 3.2

Value of Farm Production
Summary for Basin Counties

County	1961 $	1966 $	1971 $	1976 $	Increase Factor
Dundas	4,744,400	8,908,200	9,521,650	24, 939,750	5.2
Glengarry	6,567,350	8,286,450	10,781,250	22,125,200	3.4
Grenville	3,847,675	4,543,425	5,694,850	11,213,800	2.9
Leeds	7,035,475	7,770,825	9,815,200	18,694,250	2.7
Ottawa/Carleton	12,572,750	14,390,275	21,919,350	35,355,150	2.8
Prescott	7,088,125	9,505,825	12,125,450	25,886,900	3.7
Russell	6,353,775	8,495,675	7,870,300	15,103,550	2.4
Stormont	5,518,525	6,823,700	7,371,150	16,919,900	3.1
Total	53,728,075	68,724,375	85,099,200	170,238,500	3.2

(Source: Census of Agriculture, Ontario)

4. FARM STRUCTURE:

4.1 Introduction

The structure of farms in the Basin was determined by a review of Census of Agriculture statistics, Ontario Ministry of Agriculture and Food statistics and by means of interviews with representatives of marketing boards and knowledgeable individuals in the area.

Three major problems limit the accuracy of the following description of farming in the Basin. First, the geographic area of the Basin differs from the geographic areas used to compile statistics. Most statistical information is reported on a township or county basis. In the case of the Census of Agriculture, we were able to use enumeration areas which are generally about one-quarter as large as townships thus providing more accurate information than would have been available on a township basis. The second major problem relates to the time lag since the last census was completed. The most recent Census of Agriculture data are for 1976. We expect change has occurred in the characteristics of farms in the past four years but cannot accurately measure these changes.

The third problem involves the concept of "farmer". In the following report only farms which reported sales of $2,500 or more are included. There were 2,747 farmers with sales this large in 1976. In the same year a total of 3,797 landowners reported farm sales of $50 or more. The 1,050 operators of small agricultural holdings operated 86,926 acres of land. This land is not included in the description of the structure of farms in the Basin, but is included later in the section on land capability and land use and in the section where alternative development approaches are analyzed.

The above data limitations pose some problems but do not seriously reduce the validity of the following characterization of farming in the Basin. The use of enumeration areas supplemented by accurate data for the dairy industry provides as good a description of the farms in the Basin as is presently possible.

4.2 Data Sources

The structure of farming in the Basin was determined primarily from analysis of Census of Agriculture data. Two approaches are used to describe the Basin Area. The first, using enumeration areas is considered the more accurate and the second based on townships in the Basin is included as a check on the first. The Basin was defined on enumeration area maps. If 50 percent or more of the area in the enumeration area was judged to be in the Basin then all of that enumeration area was included in the analysis. If less than 50 percent of the land in an enumeration area was in the Basin, it was excluded. A special run was conducted by Statistics Canada for the enumeration areas considered to be in the Basin.

Data from all of the townships which are entirely or partly in the Basin was collated to provide a historical picture of trends in the general area. While this data file includes a few farms outside the Basin, it does provide an excellent indication of changes which have occurred in the Basin and the area around it.

An accurate, up to date description of dairy farming in the Basin was acquired by identifying on a map each milk producer registered with the Ontario Milk Marketing Board. The Ontario Milk Marketing Board generously provided a description of the farm and herd characteristics of all farmers in the Basin. Data on egg and hog producers was acquired from their respective marketing boards but they were unable to provide the amount of detail contributed by the Ontario Milk Marketing Board.

Detailed discussion of dairy, hog and egg production is included in later sections of this report.

4.3 Structural Characteristics

The 1976 and 1971 Census of Agriculture enumeration area data for the Basin was tabulated by type of farm enterprise. The enterprise classification differed slightly for the two time periods but are generally comparable. The major difference was that in 1971 farms receiving 51 percent or more of their income for the sale of cattle, hogs and sheep were grouped together while in 1976, cattle and hog farms were reported separately. In 1971, forestry farms were reported separately but in 1976 were combined with miscellaneous specialty farms. In 1976, 12 different types of farms were identified. For ease of analysis, we have chosen to aggregate the 4 wheat, 180 small grains, 15 field crops and 1 field crop combination into a single group. The 42 livestock combination farms have been combined with the 388 cattle farms and the 55 miscellaneous specialty with the 46 "other combinations".

In 1971 there were 3,008 farms with sales of $2,500 or over in the Basin area, based on the enumeration data analysis*. This decreased to 2,747 in 1976, a reduction of 8.3 percent. The number and percentage of farms with an income of $2,500 or over in 1971 and 1976 are shown by type in Table 4.1. Dairy farms are the most prevalent type in the Basin area. In 1971 almost four-fifths of the farms received 51 percent or more of their income from the sale of dairy products. Both the absolute number and the relative importance of dairying decreased from 1971 to 1976. The number of dairy farms decreased by 23 percent to 1,827. By 1976 two-thirds of the farms in the study area were dairy operations.

As may be seen in Table 4.1, the only other type of farm which is relatively common in the study area are livestock enterprises. The 505 cattle, hog and livestock combination farms in 1976 represented

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*The term Basin area is used because the area differs slightly from that of the river basin.

TABLE 4.1

Type of Farms in River Basin
1971 and 1976

	1971		1976		Change	
	#	%	#	%	#	%
Dairy	2374	79.0	1827	66.4	-547	- 23.0
Cattle/hogs, etc.	389	12.9	505	18.4	+116	+ 29.8
Poultry	87	2.9	63	2.3	- 24	- 27.6
Field Crops, etc.	70	2.3	200	7.3	+130	+185.7
Fruit & Vegetables	35	1.2	51	1.9	+ 16	+ 45.7
Miscellaneous Specialty	37	1.2	55	2.0	+ 18	+ 48.6
Other	16	0.5	46	1.7	+ 30	+187.5
Total	3008	100.0	2747	100.0	-251	- 8.3

18.4 percent of all farms. They increased from 389 in 1971 to 505 in 1976, an increase of almost 30 percent. Over this time period, non-dairy livestock farms increased in relative importance. During the same period, poultry farms decreased in numbers from 87 to 63, a decrease of almost 28 percent.

Crop oriented farms increased in numbers quite rapidly from 1971 to 1976 but they still represent only 13 percent of all farms in the area. Some of these farms undoubtedly have a livestock enterprise which provides less than half of their total income.

Generally, the area is one in which livestock are raised by a very large majority of farmers. Dairy farming is practiced by approximately three times as many farmers as other types of livestock production. While dairy farming is extremely important, its relative importance is decreasing as farmers switch to beef and hog production. Poultry production is limited to a relatively small number of producers, most of whom are egg producers and the number of these farmers is decreasing. Field crop production as a primary source of income is increasing in importance. This reflects the increase in the production of corn in the area between 1971 and 1976.

The number of dairy farms in the Basin, registered with the Ontario Milk Marketing Board, was approximately 1,350 in November 1980. If we assume that none of the other livestock, hog or field crop type farms in 1976 were registered with the Ontario Milk Marketing Board, then the number of dairy farmers declined by approximately 475 from 1976 to 1980. This represents a decrease of about 25 percent. The decrease was probably somewhat larger but it is impossible to estimate it exactly because we do not know how many farms had dairy sales of less than 51 percent of total sales in 1976 and the geographic areas involved are not quite the same. There is reason to believe the number of dairy farms in the study area has decreased and will continue to do so in the future. This will be more fully discussed in the dairy commodity section.

The distribution of different types of farms throughout the River Basin is shown by township in Table 4.2. This data is based on the 1976 Census of Agriculture and has probably changed somewhat as discussed above.

The 1,827 dairy farms are widely distributed throughout the Basin area. Grenville is the only county in which dairy farms do not outnumber all other types of farm enterprises. In this area, as may be seen in Table 4.2, from one-third to one-half of the farms in Augusta, Edwardsburgh, South Gower and Oxford on Rideau, are dairy farms. The greatest proportion of dairy farms is in Finch Township where 80.8 percent of all farms in 1976 were dairy enterprises. Winchester Township, however,

TABLE 4.2

Farm Type by Township

Township	Dairy	Livestock	Poultry	Field Crops	Fruits & Vegetables	Other	Total	
	%	%	%	%	%	%	#	%
Matilda	63.2	22.5	-	7.7	3.3	3.3	182	100.0
Mountain	66.8	18.1	2.9	7.8	1.5	2.9	205	100.0
Williamsburgh	69.7	13.1	2.0	9.1	1.0	5.1	99	100.0
Winchester	78.4	13.8	0.7	5.2	-	1.9	269	100.0
Kenyon	76.6	9.4	1.6	6.2	-	6.2	64	100.0
Augusta	45.3	36.1	3.1	6.2	3.1	6.2	97	100.0
Edwardsburgh	50.8	33.6	5.5	5.5	-	4.6	110	100.0
South Gower	38.5	36.4	2.3	15.9	2.3	4.6	44	100.0
Oxford on Rideau	33.3	40.0	-	6.7	10.0	10.0	30	100.0
Cumberland	56.2	18.2	0.8	4.1	14.1	6.6	121	100.0
Gloucester	52.0	32.0	-	8.0	-	8.0	25	100.0
Osgoode	50.0	29.6	1.7	9.1	3.5	6.1	230	100.0
Alfred	74.3	8.6	5.7	11.4	-	-	35	100.0
Caledonia	75.3	11.9	3.7	7.5	0.8	0.8	134	100.0

Table 4.2 (Cont'd)

Township	Dairy	Livestock	Poultry	Field Crops	Fruits & Vegetables	Other	Total	
	%	%	%	%	%	%	#	%
North Plantagenet	63.2	19.4	4.1	8.2	-	5.1	98	100.0
South Plantagenet	72.6	10.5	11.1	5.2	-	0.6	172	100.0
Cambridge	76.6	10.8	1.9	7.6	2.5	0.6	158	100.0
Clarence	60.4	24.3	0.7	7.6	0.7	6.3	144	100.0
Russell	76.0	14.0	0.6	4.7	1.2	3.5	171	100.0
Finch	80.8	9.3	-	5.5	-	4.4	182	100.0
Osnabruck	66.7	13.3	-	13.3	-	6.7	15	100.0
Roxborough	70.3	13.6	1.2	12.4	0.6	1.9	162	100.0
Total Number In Basin	1827	505	63	200	51	101	2747	
Percentage	66.4	18.4	2.3	7.3	1.9	3.7	100.0	

has the greatest number of dairy enterprises; 210 dairy farms representing 78.4 percent of the total 269 farms.

Livestock farms, that is farms on which beef, hog and combinations of beef and hogs are the major source of income, are most prevalent in Grenville County and Osgoode and Gloucester Townships in the Regional Municipality of Ottawa/Carleton. The 505 livestock farms represent approximately one-sixth or fewer of all farms in most other townships.

The number of poultry farms is relatively small, 63, and they are widely dispersed across the Basin area except for about one-third of them which are concentrated in the Townships of South Plantagenet. Fruit and vegetable farms which numbered only 51, were similarly dispersed with a concentration of 17 farms in Cumberland Township.

The 200 field crop farms, those where wheat, field crops, small grains or a combination of these crops are the primary source of income, are widely distributed throughout the Basin area. Such farms are most prevalent in Osgoode Township and in Dundas County. While the number of farms in Dundas tend to be larger in absolute terms than most other areas, they are relatively unimportant compared to dairy and livestock farms. It should be noted that, as shown in Table 4.1, the distribution of farms has been changing and at the present time, livestock and field crop type farms have probably increased in importance.

4.4 Land Use

It is difficult to estimate land use from the Census of Agriculture data because the Census enumeration boundaries are not the same as those of the Basin. We can determine land use changes in the Basin Study Area and these provide a good indication of trends in the actual Basin. In 1971, the 3,008 farmers with sales of $2,500 or over operated a total of 589,419 acres. In 1976 the 2,747 farmers with similar sales only operated 577,442 acres. The reduction of 2 percent of total acreage operated suggests that a small amount of land has shifted out of commercial agricultural production. This land is probably owned or rented by "farmers" who have sales of less than $2,500 or other landowners.

In the Basin study area in 1971, 80.6 percent of the land was improved and 54.2 percent was in crops. In 1976, the same percentage was improved but the percentage in crops increased to 60.6 percent. The percentage in woodland remained virtually unchanged at 9.4 percent.

In 1976, 73.3 percent of the land in the study area was utilized for dairy production. Just over 75 percent of the improved land was used for dairy production. The average dairy farm consisted of 231.5 acres of which 192.6 acres were improved land. This compares to 111.0 improved acres for livestock farms and 194.1 improved acres for field crop farms.

4.5 Farm Size

The size distribution of farms in the study area by type of enterprise is shown in Table 4.3. Just under one-third (31.4%) of all farms are from 1 to 129 acres in area. Just over one-third (36.5%) are from 130 to 139 acres in size and the remainder are larger. Generally, the dairy farms are larger than all others and poultry and fruit and vegetable farms are quite small. The livestock farms are surprisingly small in size. While this may be partly due to hog farms, the cattle farms are relativel small. This may be due to the fact that many livestock farms are really hobby farms. The field crop farms also tend to be smaller than one would anticipate given the acreage required to provide a reasonable net income.

Comparison of the 1971 and 1976 distributions of farms by size indicates a tendency for farm size to increase. The percentage of farms which are 240 acres or larger increased from 26.2 percent in 1971 to 31.3 percent in 1976.

TABLE 4.3

Farm Size by Type 1976

Size In Acres	Dairy	Livestock	Poultry	Field Crops	Fruits & Vegetables	Other	Total
	%	%	%	%	%	%	%
1-129	19.6	56.6	66.6	36.5	78.5	61.4	31.4
130-239	41.9	27.5	12.7	32.0	17.6	20.8	36.5
240-399	29.6	12.1	17.5	13.5	3.9	9.9	23.7
400-759	8.5	3.4	3.2	15.0	-	5.9	7.7
760+	0.4	0.4	-	3.0	-	2.0	0.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of Farms	1827	505	63	200	51	101	2747

4.6 Capital Investment

Total market value of land, buildings, machinery and livestock in the area increased very substantially from 1971 to 1976. In 1971, 88.9 percent of the farmers had a capital investment of less than $99,949, 9.7 percent from $99,950 to $199,949 and only 1.4 percent over $199,949. In 1976, the comparable percentages were 37.2 percent, 39.9 percent and 22.8 percent respectively.

Even these capital values appear low by present standards and are probably much larger now. The total value of all farm capital in Canada increased by a factor of 2.39 from 1971 to 1976 and a factor of 3.53 from 1971 to 1979 in nominal terms. This means that a farmer with a capital investment of $100,000 in 1971 would now, on average, have a capital investment of $353,000. In the study area, average total capital investment per farm increased by 2.51 times in the 5 year period and land and buildings increased 2.90 times. These increases are equivalent to an annual rate of 18 percent and 27 percent respectively.

The dairy farms have higher levels of capitalization than the other farms in the study area. Over one-quarter (27.0%) had assets valued at over $199,950 in 1976. This compares to 25.5 percent of field crops, 25.4 percent of poultry and 10.7 percent of livestock farms.

Average capital value of farms in the area in 1976 was $151,950 of which $106,800 was land and buildings, $26,269 machinery and equipment and $18,882 was livestock and poultry. The total average capital values by farm type were as follows: dairy $165,313; livestock $110,794; poultry $16,790; field crops $161,948; fruits and vegetables $111,018; and miscellaneous $111,365.

4.7 Sales

Farm sales like farm investments increased substantially from 1971 to 1976. In 1971, 90.3 percent of the farmers had sales between $2,500 and $24,999 while in 1976 the percentage was only 54.0 percent. In 1976, 5.9 percent had sales of $75,000 and over; 40.1 percent had sales between $25,000 and $75,000. The percentage of farms with sales in excess of $75,000 per year were as follows: dairy 5.5 percent; livestock 2.8 percent; poultry 46.0 percent; field crops 6.5 percent; fruits and vegetables 3.9 percent; and other 4.0 percent.

4.8 Tenure

By far the majority of farms in the area are individually owned. A few partnerships exist and companies which are few in number are mainly family owned companies. The percentages of each were: individual ownership 91.5 percent; partnerships 5.6 percent; family companies or corporations 2.7 percent; and other companies 0.2 percent. Little difference in ownership was found among the different types of farms. Even 85.7 percent of the poultry farms were individually owned and 11.1 percent were family owned companies. Partnerships which operated 6.9 percent of farms in 1971 decreased to 5.6 percent in 1976. The family farm is the most popular form of farming enterprise both in this area and throughout the rest of the province.

Two-thirds of the farmers own all of the land they operate but the renting of land in addition to what one owns increased in popularity. In 1971, 24.1 percent of the farmers rented additional land and in 1976 this increased to 31.6 percent. This trend is most prevalent among dairy farmers, where 38.8 percent rent additional land. This compares to 17.5 percent of poultry, 16.6 percent of livestock, 22.0 percent of field crop, 13.7 percent of fruit and vegetable and 14.9 percent of other types of farmers. Tennant farming is relatively unpopular especially among dairy farmers (1.8%) but is no more popular with field crop farmers (3.5%) than livestock (4.0%) or poultry farmers (4.8%).

When one looks at the area of land owned and rented rather than the number of farmers involved, one finds that only 19.5 percent of the land is rented. In 1971, only 14.4 percent of the land in the Basin area was rented. There has been a substantial increase in both the percentage of farmers who rent land and the area of land rented. The area of land rented in 1976 by each enterprise type was as follows: dairy 19.8 percent; livestock 15.0 percent; poultry 18.5 percent; field crops 23.6 percent; fruits and vegetables 6.5 percent and other 23.7 percent.

Almost all farmers in the Basin area reside on their farm, only 2.5 percent reside elsewhere and of these, only 0.6 percent of dairy farmers do so. Livestock (5.1%), poultry (15.9%) and field crop farmers (7.0%) are more likely to live elsewhere. Little change occurred from 1971 to 1976 in farm residency.

4.9 Crop Acreages

The single most important crop in the Basin area is tame hay. As may be seen in Table 4.4, in 1976 a total of 175,484 acres were in tame hay.. This represented half of the total acres in crops in the Basin area in 1976. Both the acreage and percentage of the total crop acreage in tame hay increased from 1971 to 1976.

The second most prevalent crop was corn. Over one-quarter (27.1%) of the acreage was in corn in 1976. The majority of 16.8 percent of the total acreage was designated for silage and 10.3 percent for grain. From 1971 to 1976 the acreage in corn for silage increased by 40 percent while the acreage in grain corn decreased slightly (5.3%). It should be noted that farmers often use the same varieties of corn for both silage and grain and switch from one to the other depending upon the crop at harvest time.

TABLE 4.4

Crop Acreages in South Nation Basin Area 1971 and 1976

Crop	Total Acreage		Average Per Farm		Number of Farms	
	1971	1976	1971	1976	1971	1976
Tame Hay	156,834	175,484	60.1	72.3	2,608	2,429
Corn Silage	42,066	58,789	24.2	35.9	1,737	1,639
Grain Corn	38,075	36,066	45.2	51.8	843	696
Fodder Oats	4,758	8,553	20.7	23.6	230	362
Other Fodder	2,749	4,347	38.2	36.8	72	118
Grain Oats	42,960	35,086	26.8	27.7	1,603	1,268
Barley	6,052	5,430	19.8	23.9	305	227
Mixed Grains	19,246	17,353	29.9	32.0	643	543
Wheat	1,037	2,429	19.9	30.0	52	81
Rye	146	208	20.9	34.7	7	6
Buckwheat	739	1,199	13.2	22.6	56	53
Dry Field Peas	32	-	16.0	-	2	-

TABLE 4.4 (Cont'd)

Crop	Total Acreage		Average Per Farm		Number of Farms	
	1971	1976	1971	1976	1971	1976
Dry Field Beans	56	130	11.2	26.0	5	5
Soy Beans	171	69	17.1	13.8	10	5
Flaxseed	-	7	-	7.0	-	1
Sunflower	113	15	37.7	15.0	3	1
Rapeseed	-	21	-	5.3	-	4
Mustard	-	139	-	17.4	-	8
Pototoes	1,626	1,261	38.7	43.5	42	29
Tobacco	-	2	-	2.0	-	1
Other field crops	1,831	1,781	261.6	84.8	7	21
Vegetables	528	599	9.6	10.7	55	56
Tree fruits	408	564	11.7	19.5	35	29
Small fruits	22	33	1.5	2.5	15	13
Total Acres	319,449	349,565	106.2	127.3	3,008	2,747

The other major grain crops in 1979 were oats (10.1%), mixed grains (5.0%) and barley (1.6%). The acreage of all of these grain crops decreased from 1971 to 1976. Other crops were relatively unimportant and only accounted for approximately 6 percent of the acreage in crops in 1976. It is worth noting that the acreage in soybeans decreased from 171 acres in 1971 to 69 acres in 1976. The acreage in potatoes also decreased while vegetables, tree fruits and small fruits all increased in acreage.

The total acreage in crops increased from an average of 106.2 to 127.3 acres during the five year period. As previously noted, the number of farms decreased from 3,008 to 2,747.

The dairy farms which represented two-thirds (66.5%) of farms in the Basin area in 1976, grew a very high proportion of the crops. These farms for example accounted for 88.6 percent of the silage corn, 82.6 percent of the mixed grains, 78.3 percent of the tame hay, 77.5 percent of the wheat and 65.4 percent of the barley acreage.

4.10 Livestock

Trends in total livestock numbers and number per farm are shown in table 4.5. The total number of livestock in the study area decreased from 1971 to 1976 while the number per farm increased. The number of cattle decreased slightly from 151,154 to 146,815, a decrease of 2.9 percent, while milk cows decreased by 9.9 percent. The number of hogs decreased by 33.0 percent and the number of hog farms by 44.1 percent. The number of hens and chickens decreased from 995,836 to 870,232 or 12.6 percent and laying hens by 15.8 percent. The number of sheep more than doubled due to an increase in the number of farms. While the number of turkeys, geese and ducks increased, the numbers involved are quite small and for most producers these fowl are a hobby or a minor sideline.

TABLE 4.5

Livestock Numbers in South Nation Basin Area 1971 and 1976

Livestock	Total Number		Average Per Farm		Number of Farms	
	1971	1976	1971	1976	1971	1976
Cattle	151,154	146,815	55	60	2,743	2,449
Milk Cows	79,638	71,790	32	38	2,500	1,912
Pigs	35,842	24,026	47	56	762	426
Sheep	2,171	4,646	48	56	45	83
Hens & Chickens	995,836	870,232	2,004	1,925	497	452
Laying Hens	708,675	596,409	1,534	1,709	462	349
Turkeys	65	312	13	15	5	21
Geese	566	1,323	11	16	53	82
Ducks	508	1,494	6	10	83	150
Total					3,008	2,747

The relative importance of dairy farming is indicated by the fact 85.0 percent of all cattle in the study area are on dairy farms. Almost all the milk cows (99.1%) are on farms which receive over half of their income from dairy sales. Only 10.5 percent of the cattle were found on cattle farms in 1976 even though these farms represented 14.1 percent of the total farms.

4.11 Labour

The number and proportion of farmers reporting paid labour decreased from 1971 to 1976. The percentage of farms with hired workers decreased from 50.0 percent to 37.8 percent. The total number of weeks of paid labour decreased from 37,047 to 31,968. The average number of weeks reported per farm increased from 24.6 to 30.8 weeks. The number of year round paid workers decreased from 482 to 452.

Most of the paid workers appear to work on dairy farms with 73.5 percent of the year round workers doing so. The number of year round paid farm workers on dairy farms decreased very little from 1971 to 1976. The number of full time workers on livestock farms decreased substantially. In the case of livestock farms, the decrease was from 12.9 percent in 1971 to 7.3 percent in 1976.

Off-farm work appears to be increasing in terms of total days worked off the farm. There was no substantive change in the number of farmers reporting off-farm work, 720 in 1971 and 721 in 1976. The respective percentages were 23.9 percent and 26.2 percent. The average number of days worked were 133.8 and 170.4 days in 1971 and 1976 respectively.

Off-farm work varies considerably by type of farm. Only 18.7 percent of the dairy farmers reported off-farm work in 1971. This decreased to 14.6 percent in 1976. Dairy farmers who reported off-farm work did so for an average of 107.8 days in 1971 and 120.7 days in 1976. Poultry farmers worked an average of 226 days in 1971, which is equivalent to full-time and 199 days in 1976. Livestock farmers who had an off-farm job increased their average job time from 175.7 days in 1971 to 210.8 days in 1976. The average number of days worked off-farm by the field crops farmers were 166.4 days in 1971 and 175.2 days in 1976.

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CHAPTER III

AGRICULTURAL RESOURCE BASE

The agricultural resource base of the South Nation River Basin has been examined from two points of view. First, we analyzed the physical base and its suitability to sustain different forms of agricultural production, as well as the current patterns of land use and drainage. Secondly, we have examined the agricultural environment which includes some of the effects that agricultural practices may have on the land and water resources of the Basin. Also, there is the matter of impacts on agriculture from other sources - such as the effects of flooding.

The major elements of the agricultural resource base are described below under a series of separate headings. The headings are:

1. Introduction
2. The Physical Base for Agriculture
3. Land Use in The Basin
4. Land Drainage in The Basin
5. Agricultural Environment

1. INTRODUCTION:

The land use characterization of the South Nation River Basin has drawn heavily on four sources of information. They are, the County Soils Reports and Map, the Canada Land Inventory Soil Capability for Agriculture, the recently completed Agricultural Land Use System maps, and the Tile Drainage Survey. Area measurements of the Canada Land Inventory mapping and the Agricultural Land Use System map are presented on a basin and sub-basin basis, as well as on a township basis for the area of each township that lies within the Basin.

Since no sub-basin units were previously defined by the Conservation Authority, 6 sub-basin units were identified and delineated for this Study. (Figure 1.) These include:

(a) Upper South Nation sub-basin -- the drainage area above the Chesterville Dam
(b) The Castor River sub-basin
(c) The Bear Brook sub-basin
(d) The Payne River sub-basin
(e) The Scotch Creek sub-basin
(f) The Lower South Nation sub-basin -- the drainage area remaining after the above five units were outlined

The outline of the Basin area was transposed from the official map in the Authority's Office at Berwick onto 1:50,000 scale topographic maps. The sub-basin units were established utilizing the 1:50,000 scale topographic maps and delineating the sub-basin on the drainage patterns and height of land.

For the agricultural soil capability assessment, 1:50,000 scale maps were obtained from the Ontario Ministry of Agriculture and Food. For the agricultural land use system assessment, township maps at a scale of 1:50,000 were obtained from the Foodland Development Branch of

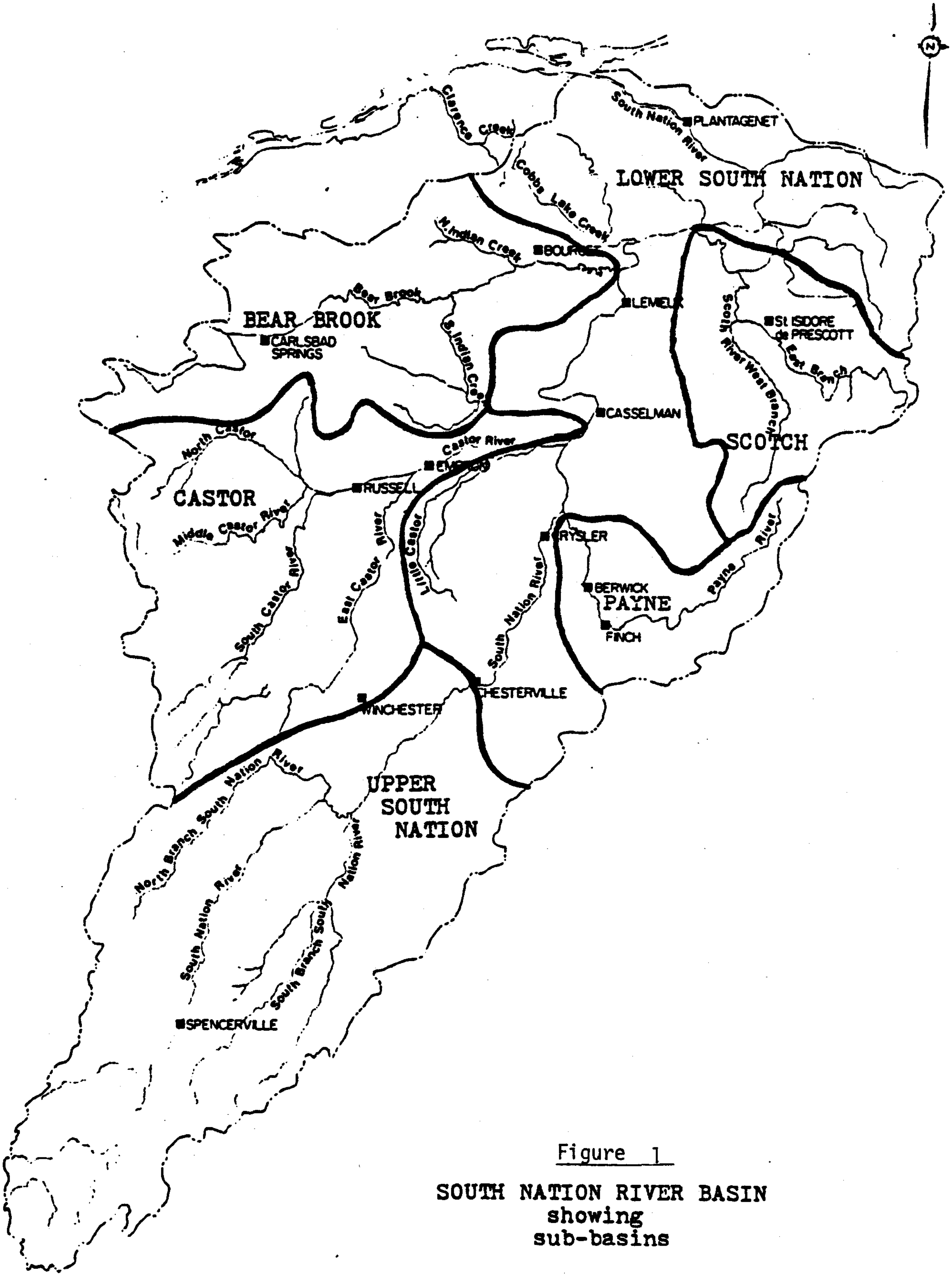

Figure 1

SOUTH NATION RIVER BASIN
showing
sub-basins

the same Ministry. This survey was begun in 1978 and completed in the latter part of 1980. Some of the mapping is based on 1979 data. This was being updated during our analysis but the results were not available in time to include in this assessment program. It is doubtful whether the 1980 data would change the pattern or percentages appreciably. The data on tile drainage was obtained from manuscripts and card indexes and from map information that was in a preliminary state.

Aerial photography at a scale of 1:20,000 was utilized for stereoscopic analysis of specific areas and to supplement information on land uses and drainage. Numerous reports and documents were also reviewed for data on climate, soils, drainage, fertilizers, and other aspects of agriculture. These are listed in the bibliography.

Area measurement of the land use system maps and the land capability maps was carried out utilizing a dot grid planimeter and the acreage data is presented in tabular form.

2. THE PHYSICAL BASE FOR AGRICULTURE:

2.1 Soils and Physiography

The Basin is endowed with a variety of soil conditions which occur both in very complex and intermixed patterns, as well as in broader and more extensive patterns. These soil patterns control the agricultural capability and agricultural land use which is found in the Basin.

Table 2.1 provides a summary of the soils found in the Basin. This classification identified the parent material groups and the drainage members. Twenty-eight different soils have been recognized. In addition, some of these soils are further subdivided into textural, stony and depth phases, as well as grouped into complexes because they are so intricately mixed. The soils are associated with different physiographic units, an outcome of the glacial and postglacial activity. Figure 2 provides a very generalized distribution of the physiographic units. The soils within the physiographic units are identified with 8 geomorphic or parent material groups and include such features as till plains, sandy and gravelly outwash deposits, deltaic deposits, lacustrine and marine sediments and organic materials.

(1) Soils Developed on Glacial Tills - The soils in this group are either medium-textured or fine-textured, depending on the origin of the parent materials. The Vars gravelly loam soil has developed on red coloured shaly or gravelly materials, while the Grenville loam, Matilda loam and Lyons loam have developed on stony calcareous medium-textured till materials. The Wolford clay loam soil, the Morrisburg clay loam and the Osnabruck clay loam have developed on fine-textured calcareous till materials.

(2) Soils Developed on Gravel Outwash - Soils in this group have developed on coarse textured calcareous gravels and include the Kars gravelly sandy loam.

TABLE 2.1

Classification of Soils in the South Nation Basin

A. Soils Developed on Glacial Till
   1. Red coloured shaly or gravelly loam parent material
      (a) Good drainage
         1. Vars gravelly loam (Vgl)

   2. Stony calcareous loam parent material
      (a) Good drainage
         1. Grenville loam (Gl)

      (b) Imperfect drainage
         1. Matilda loam (Ml)

      (c) Poor drainage
         1. Lyons loam (Ll)

   3. Fine textured calcareous parent material
      (a) Good drainage
         1. Wolford clay loam (Wcl)

      (b) Imperfect drainage
         1. Morrisburg clay loam (Mcl)

      (c) Poor drainage
         1. Osnabruck clay loam (Obcl)

B. Soils Developed on Gravel Outwash
   1. Coarse calcareous gravel parent material
      (a) Good drainage
         1. Kars gravelly sandy loam (Kgsl)

Table 2.1 (Continued)

C. Soils Developed on Sandy Outwash or Sandy Deltaic Deposits
  1. Non-calcareous fine sand parent material
    (a) Good drainage
      1. Upland fine sand (Ufs)

    (b) Imperfect drainage
      1. Rubicon fine sand (Rfs)

    (c) Poor drainage
      1. St. Samuel fine sand (Sfs)
      2. Granby sandy loam (Gsl)

D. Soils Developed on Sandy Deltaic Deposits overlying Clay Deposits
  1. Non-calcareous fine sand parent material
    (a) Imperfect drainage
      1. Mountain fine sandy loam (Mnfsl)

    (b) Poor drainage
      1. Allendale fine sandy loam (Afsl)

E. Soils Developed on Deltaic Deposits of Layered Silt and Fine Sand overlying Clay Deposits
  1. Layered silt and fine sand parent material
    (a) Imperfect drainage
      1. Castor fine sandy loam (Cfsl)

    (b) Poor drainage
      1. Bainsville silt loam (Bsil)
      2. Marionville fine sandy loam (Mfsl)

F. Soils Developed on Lacustrine Clay Deposits
  1. Non-calcareous layered red and grey clay parent material
    (a) Imperfect drainage
      1. Wendover clay (Wc)

    (b) Poor drainage
      1. Bearbrook clay (Bc)

Table 2.1 (Continued)

2. Calcareous, loam and silt loam parent materials
    (a) Poor drainage
        1. Osgoode loam (Ol)

3. Calcareous grey clay parent material
    (a) Imperfect drainage
        1. Carp clay loam (Ccl)

    (b) Poor drainage
        1. North Gower clay loam (Ngcl)

4. Non-calcareous grey clay parent material
    (a) Poor drainage
        1. St. Rosalie clay (Roc)

G. <u>Soils Developed from Organic Materials</u>
    1. Shallow underlain by clay
        (a) Very poor drainage
            1. Belmeade muck (Bm)

    2. Deep organic deposits
        (a) Very poor drainage
            1. Muck (M)

H. <u>Soils Developed on Limestone Bedrock</u>
    1. Shallow
        (a) Good drainage
            1. Farmington loam (Fl)

I. <u>Miscellaneous Soils</u>
    1. Bottomlands (Bl)

    2. Eroded Channels (Er)

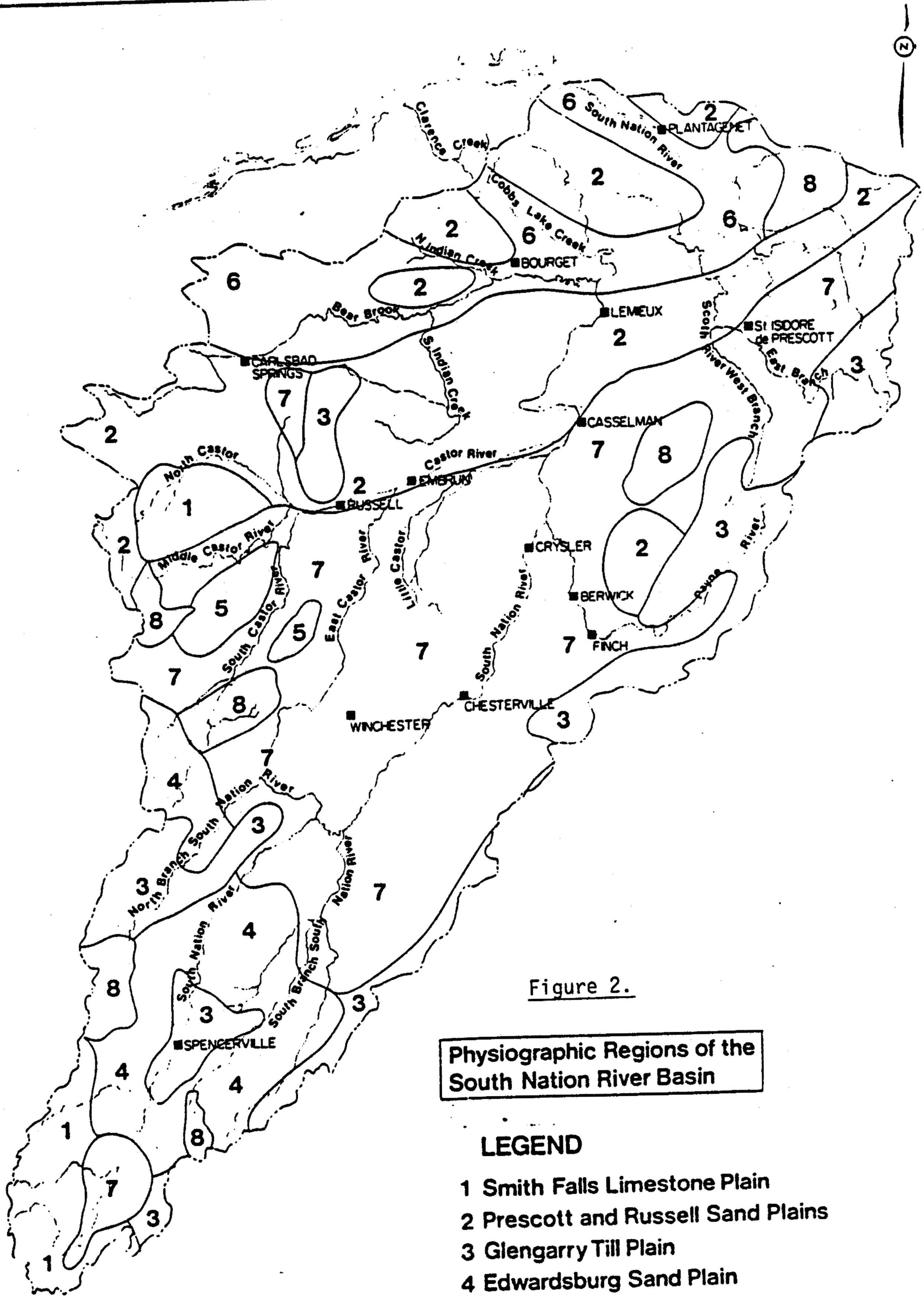

Figure 2.

Physiographic Regions of the South Nation River Basin

LEGEND

1 Smith Falls Limestone Plain
2 Prescott and Russell Sand Plains
3 Glengarry Till Plain
4 Edwardsburg Sand Plain
5 North Gower Drumlin Field
6 Ottawa Valley Clay Plains
7 Winchester Clay Plain
8 Bogs and Marshes

(3) Soils Developed on Sandy Outwash or Sandy Deltaic Deposits - Soils in this group have developed on acid or non-calcareous fine sands and include the Upland fine sand and fine sandy loam, the Rubicon fine sandy and find sandy loam and the St. Samuel fine sand and Granby sandy loam.

(4) Soils Developed on Sandy Deltaic Deposits overlying Clay Deposits - This group of soils has developed in fine sandy deposits which overly fine-textured lacustrine sediments. Included in this group are the Mountain fine sandy loam, and the Allendale fine sandy loam.

(5) Soils Developed in Medium-Textured Deltaic Deposits overlying Clay Deposits - The medium-textured deltaic deposits comprise layered silts and fine sands and include the Castor fine sandy loam, the Bainsville silt loam and the Marionville find sandy loam.

(6) Soils Developed on Lacustrine Clay Deposits - The soils in this group are associated with four different parent materials, subgroups that have regional characterizations within the Basin. The Wendover clay and Bearbrook clay are associated with non-calcareous layered red and grey clays found in the Ottawa Valley clay plain region, while Carp clay loam and the North Gower clay loam are associated with grey calcareous clay parent materials found in the Winchester clay plain. The Osgoode loam is identified with calcareous moderately fine-textured loams and silt loams of lacustrine origin. The St. Rosalie clay is associated with non-calcareous grey clay parent materials.

(7) Soils Developed on Limestone Bedrock - This group of soils is identified with the limestone bedrock plain that occurs along the western flank of the basin. The Farmington loam soil is the only member associated with this group.

(8) Soils Developed from Organic Materials - This group is identified with two members: 1. The belmeade muck, which comprises a

shallow organic layer over clay, and 2: The deeper member which is identified simply as a muck soil.

2.2 Climate

The South Nation River Basin lies within the Eastern Counties Climatic Region and is characterized by a continental type climate with warm summers and cold winters. The mean annual temperature for the region is 43°F. (6°C.); this is about 5°F. (3°C.) cooler than the Kent-Essex Region. In terms of temperatures, these range throughout the season from a mean daily maximum of 24°F. (-4°C.) in January, to 81°F. (27°C.) in July; the mean daily minimums for the same periods are 5°F. (-15°C.) and 57°F. (14°C.) respectively. The northern part of the Basin is cooler than the southern part.

Most important to the agricultural production of the Basin and, in particular, the annual crops, is the length of the frost-free period. In the Basin, this ranges from 140 days in the south to 130 days in the north. The mean date for the last frost in spring is the 15th of May, while the mean date for the first frost in the autumn ranges from the 15th of September in the northern part to the 30th of September in the southern part. The actual dates of first and last frost differ from the mean. These range from 3 to 15 days and vary with locality and topography, with the low-lying pockets being more prone to early and late frosts.

The growing period ranges from 190 days in the northern part of the Basin to 200 days in the south. In terms of "growing degree days" (number of degrees of mean daily temperature above a base of 42°F.(6°C.), the Basin lies within a zone that has 3,400 growing degree days. Another expression of the growing period, particularly for more sensitive plants is the "corn heat unit". The Basin has a range of values from 2,500 in the north to 2,700 in the south. These values are adequate for the growing and maturing of early varieties of corn and soybeans.

The mean annual precipitation ranges from 810 mm on the western flank to 890 mm on the eastern flank. The mean annual snowfall follows a similar pattern with 2030 mm on the western flank and 2440 mm on the east. The rainfall is distributed evenly throughout the year. The mean monthly precipitation is greater than 76 mm, except for May, October and November.

The mean annual actual evapo-transpiration is between 530 mm and 560 mm, with a mean annual water deficiency of 50 mm. The mean annual water surplus ranges across the Basin from 280 mm on the western flank to 380 mm on the eastern flank.

The South Nation River Basin is well endowed with a favourable climate for most perennial and cereal crops. A drier fall period would be more favourable to the maturing of crops such as corn and soybeans, and to the harvesting of these crops.

2.3 Land Classification

The soil types are shown on the County Soils Maps and have formed the basis for the Canada Inventory Soil Capability for Agriculture. Each of the soil units has been ranked and accorded a capability class and subclass, depending on the nature and severity of the physical limitation. The Canada Land Inventory Soil Capability Classification is an interpretive classification based on physical criteria and conditions.

The soils have been ranked into 7 different classes, with the exception of the organic soils which are identified separately. In some cases, the soil capability has been expressed as a complex. This ranking provides some measure of simplification, and with the subclass, identifies the major constraint or constraints of the soils.

Table 2.2 outlines the classification system and subclass categories. Figure 3 presents a generalized picture of the distribution of the capability classes.

Table 2.3 details the acreage of the agricultural capability classes and subclasses identified in the South Nation Basin and sub-basins.

While the South Nation River Basin is not well endowed with extensive areas of the highest quality land, it does have large areas of good quality land which are capable of sustained use for cultivated field crops. Fully 61.2 percent or 590,570 acres in the Basin have been classified into soil capability Classes 1, 2 and 3. A further 16.4 percent or 158,920 acres have been classified into soil capability land Class 4. These four classes constitute the potentially arable lands in the Basin and indicate that over 77 percent of the Basin is considered capable of sustained use for cultivated field crops.

Over 123,940 acres or 12.8 percent of the Basin has been identified with soil capability Classes 5 and 6. In general, these lands are considered capable of sustained use for perennial forage; however, some of the shallow organic soils that are included in Class 5 are capable of intensive agricultural production where drainage has been introduced.

Over 9.0 percent of the Basin or 91,320 acres has been identified as organic soils and has not been accorded a capability class under the Canada Land Inventory system. (Some of these soils are capable of sustained crop production under intensive management systems. They do, however, need major capital inputs in terms of drainage and water control systems before they can be effectively utilized).

Within the soil capability classes, more significant is the subclass designation which identifies the limitation or constraint and

TABLE 2.2

Canada Land Inventory

Soil Capability Classification for Agriculture

Classes

CLASS 1:	Soils in this class have no significant limitations in use for crops. The soils are deep, are well to imperfectly drained, hold moisture well and in the virgin state were well supplied with plant nutrients. They can be managed and cropped without difficulty. Under good management they are moderately high to high in productivity for a wide range of field crops.
CLASS 2:	Soils in this class have moderate limitations that restrict the range of crops or require moderate conservation practices. The soils are deep and hold moisture well. The limitations are moderate and the soils can be managed and cropped with little difficulty. Under good management they are moderately high to high in productivity for a fairly wide range of crops.
CLASS 3:	Soils in this class have moderately severe limitations that restrict the range of crops or require special conservation practices. The limitations are more severe than for Class 2 soils. They affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. Under good management they are fair to moderately high in productivity for a fair range of crops.
CLASS 4:	Soils in this class have severe limitations that restrict the range of crops or require special conservation practices, or both. The limitations seriously affect one or more of the following practices: timing and ease of tillage; planting and harvesting; choice of crops; and methods of conservation. The soils are low to fair in productivity for a fair range of crops but may have high productivity for a specially adapted crop.

Table 2.2 (Continued)

CLASS 5:	Soils in this class have very severe limitations that restrict their capability to producing perennial forage crops, and improvement practices are feasible.
CLASS 6:	Soils in this class are capable only of producing perennial forage crops, and improvement practices are not feasible. The soils provide some sustained grazing for farm animals, but the limitations are so severe that improvement by use of farm machinery is impractical. The terrain may be unsuitable for use of farm machinery, or the soils may not respond to improvement, or the grazing season may be very short.
CLASS 7:	Soils in this class have no capability for arable culture or permanent pasture. This class also includes rockland, other non-soil areas, and bodies of water too small to show on the maps.
0	Organic soils (Not placed in capability classes)

SUBCLASSES

Excepting Class 1, the classes are divided into subclasses on the basis of kinds of limitation. The subclasses are as follows:

Subclass C	Adverse climate -- The main limitation is low temperature or low or poor distribution of rainfall during the cropping season, or a combination of these.
Subclass D	Undesirable soil structure and/or low permeability -- The soils are difficult to till, absorb water slowly or the depth of the rooting zone is restricted.
Subclass E	Erosion damage -- Past damage from erosion limits agricultural use of the land.
Subclass F	Fertility -- Low natural fertility due to lack of available nutrients, high acidity or alkalinity, low exchange capacity, high levels of calcium carbonate or presence of toxic compounds.
Subclass I	Inundation -- Flooding by streams or lakes limits agricultural use.

Table 2.2 (Continued)

Subclass M	Moisture -- A low moisture holding capacity, caused by adverse inherent soil characteristics, limits crop growth. (Not to be confused with climatic drought).
Subclass N	Salinity -- The soils are adversely affected by soluble salts.
Subclass P	Stoniness -- Stones interfere with tillage, planting, and harvesting.
Subclass R	Shallowness to solid bedrock -- Solid bedrock is less than three feet from the surface.
Subclass S	Soil limitations -- A combination of two or more subclasses D, F, M and N.
Subclass T	Adverse Topography -- Either steepness or the pattern of slopes limits agricultural use.
Subclass W	Excess Water -- Excess water other than from flooding limits use for agriculture. The excess water may be due to poor drainage, a high water table, seepage or runoff from surrounding areas.
Subclass X	Minor Cumulative Limitations -- Soils having a moderate limitation due to the cumulative effect of two or more adverse characteristics which individually would not affect the class rating. (This subclass is always used alone and only one class below the best possible in a climatic sub-region).

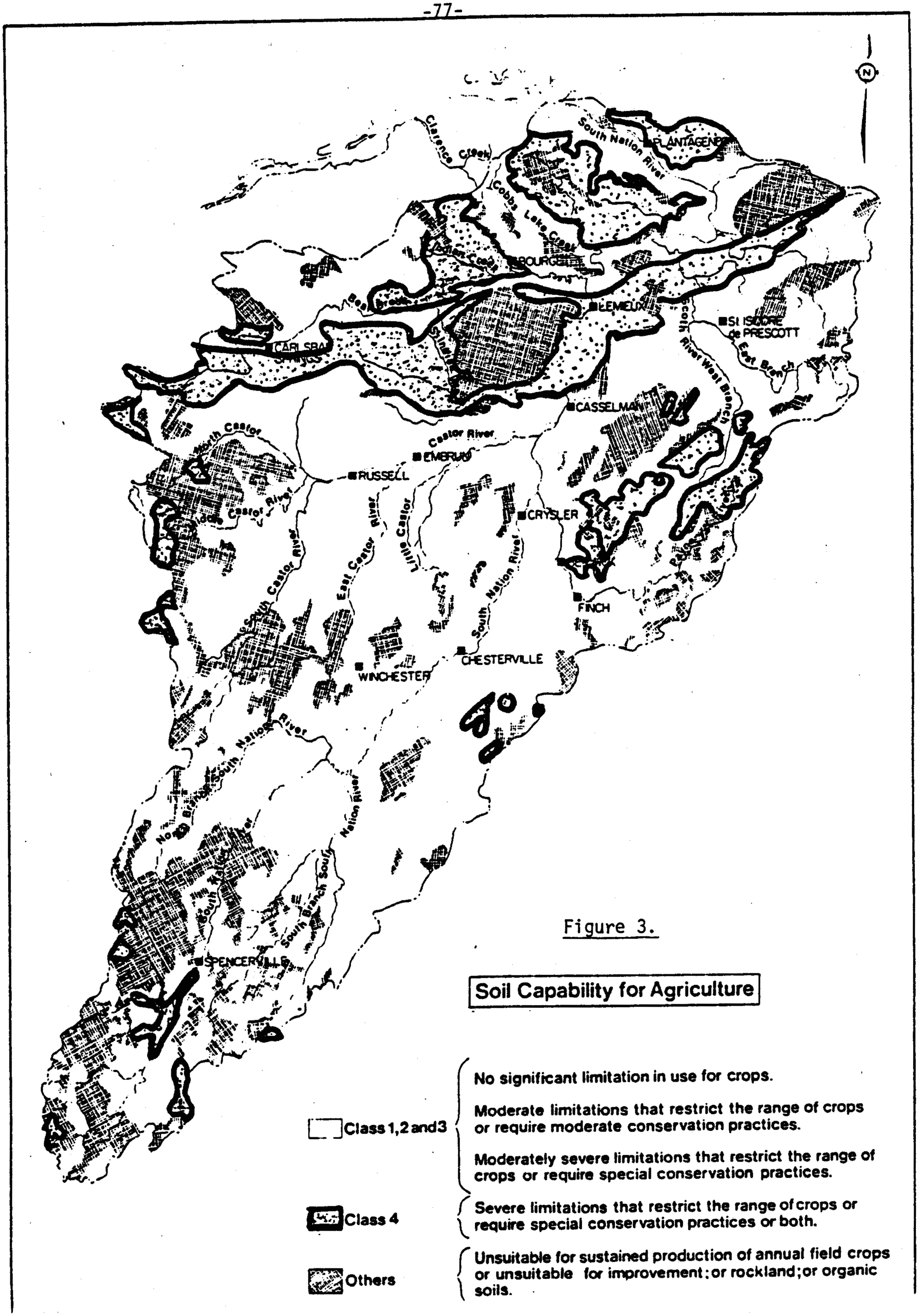

Figure 3.

Soil Capability for Agriculture

☐ Class 1,2 and 3
No significant limitation in use for crops.
Moderate limitations that restrict the range of crops or require moderate conservation practices.
Moderately severe limitations that restrict the range of crops or require special conservation practices.

▨ Class 4
Severe limitations that restrict the range of crops or require special conservation practices or both.

▨ Others
Unsuitable for sustained production of annual field crops or unsuitable for improvement; or rockland; or organic soils.

Table 2.3

SOUTH NATION RIVER BASIN - LAND CLASSIFICATION SUMMARY
by sub- basins

Land Class	Upper South Nation		Castor		Bear Brook		Payne River		Scotch River		Lower South Nation		Total Basin	
& sub class	acres	%	acres	%	acres	%	acres	%	acres	%	acres	%	acres	%
1	35531	13.9	33107	17.6	2791	2.3	2546	5.4	3867	5.6	11183	3.9	89025	9.2
2w	48822	19.1	20469	10.9	2453	2.0	8819	18.7	5204	7.6	53380	18.7	139147	14.4
2p	56		780	.4	439	.4							1275	.1
2d	4390	1.7	330	.2	5538	4.6	6327	13.4	2639	3.8	12029	4.2	31253	3.2
2f	301	.1	32196	17.0	11143	9.2			2813	4.0	9309	3.3	55762	5.8
2fm	2334	.9	656	.3			154	.3			592	.2	3736	.4
2fw											1035	.4	1035	.1
sub totals	55903	21.8	54431	28.8	19573	16.2	15300	32.4	10656	15.4	76345	26.8	232208	24.0
3f	34766	13.6	4909	2.6	3353	2.8	2916	6.2	5486	7.9	4469	1.6	55899	5.8
3w	13620	5.3	12002	6.4	26485	22.0	1121	2.4	18617	26.7	53403	18.8	125248	13.1
3s	63												63	
3d	12155	4.7					5664	12.0			9227	3.2	27046	2.8
3r	5860	2.3							1734	2.5	929	.3	8523	.9
3p	15126	6.0	15058	8.0	2698	2.2	3424	7.3	7799	11.2	7960	2.8	52065	5.4
3I	419	.2											419	
3fm											73		73	
sub totals	82009	32.1	31969	17.0	32536	27.0	13125	27.9	33636	48.4	76061	26.7	269336	28.0
4w	2870	1.1	258	.1			1223	2.6	92	.1	1333	.4	5776	.6
4f	196	.1	3931	2.1	3578	3.0			2823	4.1	15000	5.3	25528	2.6
4s	233	.1	957	.5	101	.1	38	.1	1113	1.6	2437	.9	4879	.5
4r	151	.1	6157	3.3	6								6314	.7
4fm	12592	4.9	6138	3.3	16738	13.9	5072	10.8	7786	11.2	25457	8.9	73783	7.6
4ws			512	.3	24349	20.2					17785	6.3	42646	4.4
sub totals	16042	6.3	17953	9.6	44772	37.2	6333	13.5	11810	17.0	62012	21.8	158926	16.4
5w	30538	11.9	22244	11.8	334	.3	4305	9.1	2064	3.0	5368	1.9	64853	6.7
5I	1937	.8											1937	.2
5p	845	.3									73		918	.1
5sw					13447	11.2					8769	3.1	22216	2.3
5fm	139	.1											139	
sub total	33459	13.1	22244	11.8	13781	11.5	4305	9.1	2064	3.0	14210	5.0	90063	9.3
6w	188	.1											188	
6p	162	.1	4396	2.3	603	.5	60	.1	526	.7	3602	1.3	9349	1.0
6r	9370	3.8	3588	1.9	1694	1.4			142	.2	1513	.5	16307	1.7
6wp			349	.2							502	.2	851	.1
6wf					297	.2			799	1.1	6093	2.1	7189	.7
sub totals	9720	4.0	8333	4.4	2594	2.1	60	.1	1467	2.1	11710	4.1	33884	3.5
7p									259	.4	16		275	
0	23318	9.1	20552	10.0	4455	3.7	5460	11.6	5714	8.2	31823	11.2	91322	9.4
Water											1361	.5	1361	.1
Totals	255982		188589		120502		47129		69477		284721		966400	99.9

reflects the degree or intensity of the constraint which results in the placement of that soil in a certain class. In many cases, the limitation can be ameliorated, i.e. those lands identified with a "w" constraint can be improved with the introduction of tile drainage; those that are identified with stoniness can be cleared; those lands which are identified with fertility and moisture deficiencies can be ameliorated through inputs of fertilizer and by irrigation, if water is available.

About 411,000 acres are affected with soil drainage problems. This excludes the organic soils. The degree of the soil drainage problem ranges from a moderate condition on the North Gower and Bearbrook clay to more severe conditions on the Osnabruck and Belmeade muck soils. Some of these lands lie within both the Brinston and Plantagenet flood prone areas.

Stoniness is a problem on about 63,800 acres in the Basin. Much of this occurs in very local areas associated with the Grenville tills and tops of the drumlin formation. These lands have been influenced by the earlier glacial and lake activity which has removed the soil material from amongst the bouldery tills, leaving stony and boundery shoreline pavements.

Over 292,000 acres have soils with a limitation of low inherent fertility. Some of these lands are also affected by low moisture-holding capacity, while others are associated with soil wetness. The major part of these lands are associated with the Upland, Rubicon and St. Samuel soils. The Castor loam soil is influenced to a lesser extent.

Approximately 58,300 acres have soils which are affected by adverse soil structure. Included in this group are the Wolford and Morrisburg loams which have an impervious sub-soil affecting rooting depths and internal permeability.

About 31,000 acres are affected by shallow soils overlying the limestone bedrock. About half of this acreage is very seriously affected and is identified with the Farmington loams.

Table 2.4 details the acreages of classes and subclasses within the township area that lies within the Basin.

Table 2.5 summarizes the land capability data into classes for the areas of the township within the South Nation River Basin and gives the acreage and percentage in each class. On a percentage basis, there is considerable variation in the proportion and amounts of good agricultural land between townships in the Basin. A review of the percentage of good agricultural land (Classes 1, 2 and 3) shows the differences between various parts of the Basin. It highlights those townships in the Basin which are endowed with a large percentage of their land base in high capability lands. It also identifies the concentration of high capability lands that can serve and are serving as the base for the extensive and diversified agricultural industry in the Basin.

Table 2.4: South Nation River Basin

Agricultural Land Capability, Acreage and Summary [1] For The Areas of Township Which Lie Within The Basin

acres

Land Class & Subclass	Gloucester	Osgoode	Cumberland	Russell	Clarence	Cambridge	North Plantagenet	South Plantagenet	Alfred	Caledonia	West Hawkesbury	Elizabethtown	Oxford	Augusta	Edwardsburg	South Gower	Mountain	Winchester	Matilda	Williamsburg	Finch	Osnabruck	Roxborough	Kenyon	Lochiel	Total
1	1320	18253	2413	4348	226	562	-	-	-	397	126	19	3761	3761	7149	3354	11573	11474	6913	1220	5811	834	1457	4054	-	89025
2w	807	7290	20	11345	872	14811	119	1672	279	3169	46	-	577	2644	1522	738	14681	18391	21608	7394	22702	383	7820	257	-	139147
2p	893	326	-	-	-	-	-	-	-	-	-	-	-	56	-	-	-	-	-	-	-	-	-	-	-	1275
2d	-	-	3793	-	2719	173	3712	3452	-	208	-	-	-	-	-	-	-	4690	579	2168	4229	1337	4022	171	-	31253
2f	6413	8850	1945	18824	2649	12594	-	2861	-	1325	-	-	-	-	-	301	-	-	-	-	-	-	-	-	-	55762
2fm	-	99	-	-	-	-	-	592	-	-	-	-	-	830	1126	-	792	-	143	-	154	-	-	-	-	3736
2fw	-	-	-	-	-	1035	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1035
Subtotal	8113	16565	5758	30169	6240	28613	3831	8577	279	4702	46	-	577	3530	2648	1039	15473	23081	22330	9562	27085	1720	11842	428	-	232208
3f	104	27	1992	1134	1806	272	-	70	-	-	-	353	653	4601	16273	1321	6724	140	8516	-	3235	448	5747	2483	-	55899
3w	1390	4538	20207	4763	12865	863	11590	20716	6326	10930	124	-	-	5557	1145	116	1401	7181	2219	1473	2197	678	1730	6853	386	125248
3s	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-	-	-	-	-	-	-	-	-	-	-	63
3d	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	141	3804	4482	6642	5938	2007	4032	-	-	27046
3r	-	-	-	-	-	-	-	-	-	-	-	-	109	3915	1788	-	-	48	-	-	334	132	177	2020	-	8523
3p	584	7249	2733	1975	359	40	-	-	-	1571	295	-	1787	1847	4599	1601	3857	6004	1421	555	3372	1252	2774	8190	-	52065
3l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	394	-	-	-	-	-	-	-	-	419
3fm	-	-	-	-	-	-	-	-	-	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	73
Subtotal	2078	11814	24932	7872	15030	1175	11590	20786	6326	12574	419	353	2549	15983	23805	3063	12517	17177	16638	8670	15076	4517	14460	19546	386	269336
4w	-	-	-	-	-	-	-	-	273	-	105	150	-	522	358	-	-	338	779	1684	55	252	1168	92	-	5776
4f	3840	3669	-	-	150	-	11502	5204	273	694	-	-	-	-	-	196	-	-	-	-	-	-	-	-	-	25528
4s	-	957	32	-	69	-	-	999	-	2551	-	-	-	233	-	-	-	-	-	-	-	-	38	-	-	4879
4r	-	6157	6	-	-	-	-	-	-	-	-	69	-	-	82	-	-	-	-	-	-	-	-	-	-	6314
4fm	6545	1184	6167	851	5481	3118	9535	4990	1811	2109	-	593	1029	4493	4681	726	2548	921	848	-	1691	1291	11215	1795	161	73783
4ws	-	-	8745	4475	10218	12408	813	4787	1200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42646
Subtotal	10385	11967	14950	5326	15918	15526	21850	15980	3557	5354	105	812	1029	5248	5121	922	2548	1259	1627	1684	1746	1543	12421	1887	161	158926
5w	227	7807	-	-	1413	-	-	-	-	158	151	675	1706	4669	14643	1684	12755	5147	3236	1162	1813	796	5540	1220	51	64853
5l	-	-	-	-	-	-	-	-	-	-	-	-	-	767	1170	-	-	-	-	-	-	-	-	-	-	1937
5p	-	-	-	-	-	-	-	-	-	73	-	-	728	-	94	-	-	-	-	23	-	-	-	-	-	918
5sw	-	-	-	-	8054	14162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22216
5fm	-	-	-	-	-	-	-	-	-	-	-	139	-	-	-	-	-	-	-	-	-	-	-	-	-	139
Subtotal	227	7807	-	-	9467	14162	-	-	-	231	151	814	2434	5436	15907	1684	12755	5147	3236	1185	1813	796	5540	1220	51	90063
6w	-	-	-	-	-	-	-	-	-	-	-	-	-	82	-	-	-	-	106	-	-	-	-	-	-	188
6p	997	2974	410	263	392	1821	-	-	-	-	-	-	-	12	150	-	-	116	-	-	1688	-	-	526	-	9349
6r	1119	2444	1437	25	257	46	1172	142	-	-	-	25	537	6677	2046	19	-	66	-	-	91	30	174	-	-	16307
6wp	-	-	-	-	-	851	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	851
6wl	-	-	-	971	819	-	2772	1798	-	829	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7189
Subtotal	2116	5418	1847	1259	1468	2718	3944	1940	-	829	-	25	537	6771	2196	19	-	182	106	-	1779	30	174	526	-	33884
7p	-	-	-	-	-	-	-	-	-	275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	275
0	3966	9556	1475	331	1476	3426	825	3464	4148	12728	283	302	2493	7086	7904	1919	6174	4325	1490	2124	230	2185	10801	2489	122	91322
Water	-	-	-	-	-	253	535	548	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1361
Total	28205	81380	51375	49305	49825	66435	42575	51295	14335	37090	1130	2325	13380	47815	64730	12000	61040	62645	52340	24445	53540	11625	56695	30150	720	966400

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[1] Acreages for Complex Capability units have been calculated on percentage basin and included within the subclass categories.

Table 2.5: South Nation River Basin

Summary of Major Land Classes By Township That Lie Within The South Nation Basin

Townships	Class 1 acres	%	Class 2 acres	%	Class 3 acres	%	Sub-total acres	%	Class 4 acres	%	Class 5 acres	%	Classes 6 and 7 acres	%	Organic acres	%	Total Including Water
Gloucester	1320	4.7	8113	28.7	2078	7.4	11511	40.8	10385	36.8	227	0.8	2116	7.5	3966	14.1	28205
Osgoode	18253	22.4	16565	20.3	11814	14.5	46632	57.3	11967	14.7	7807	9.6	5418	6.6	9556	11.7	81380
Cumberland	2413	4.7	5758	11.2	24932	48.5	33103	64.4	14950	29.1	-	-	1847	3.6	1475	2.9	51375
Russell	4348	8.8	30169	61.2	7872	15.9	42389	86.0	5326	10.8	-	-	1259	2.5	331	0.7	49305
Clarence	226	0.4	6240	12.5	15030	30.2	21496	43.1	15918	31.9	9467	19.0	1468	2.9	1476	2.9	49825
Cambridge	562	0.8	28613	43.1	1175	1.8	30350	45.7	15526	23.4	14162	21.3	2718	4.1	3426	5.1	66435
North Plantagenet	-	-	3831	9.0	11590	27.2	15421	36.2	21850	58.4	-	-	3944	9.3	825	1.9	42575
South Plantagenet	-	-	8577	16.7	20786	40.5	29363	57.2	15980	31.1	-	-	1940	3.8	3464	6.7	51295
Alfred	-	-	279	1.9	6326	44.1	6605	46.1	3557	24.8	-	-	-	-	4148	28.9	14335
Caledonia	397	1.1	4702	12.7	12574	33.9	17673	47.6	5354	14.4	231	0.6	1104	2.9	12728	34.3	37090
West Hawkesbury	126	11.1	46	4.1	419	37.1	591	52.3	105	9.3	151	13.4	-	-	283	25.0	1130
Elizabethtown	19	0.8	-	-	353	15.2	372	16.0	812	34.9	814	35.0	25	1.1	302	13.0	2325
Oxford	3761	28.1	577	4.3	2549	19.0	6887	51.5	1029	7.7	2434	18.2	537	4.0	2493	18.6	13380
Augusta	3761	7.9	3530	7.4	15983	33.4	23274	48.7	5248	11.0	5436	11.4	6771	14.2	7086	14.8	47815
Edwardsburg	7149	11.0	2648	4.1	23805	36.8	33602	51.9	5121	7.9	15907	24.6	2196	3.4	7904	12.2	64730
South Gower	3354	27.9	1039	8.6	3063	25.5	7456	62.1	922	7.7	1684	14.0	19	0.1	1919	16.0	12000
Mountain	11573	18.9	15473	25.3	12517	20.5	39563	64.8	2548	4.1	12755	20.9	-	-	6174	10.1	61040
Winchester	11474	18.3	23081	36.8	17177	27.4	51732	82.6	1259	2.0	5147	8.2	182	0.3	4325	6.9	62645
Matilda	6913	13.2	22330	42.6	16638	31.8	45881	87.6	1627	3.1	3236	6.2	106	0.2	1490	2.8	52340
Williamsburg	1220	5.0	9562	39.1	8670	35.5	19452	79.6	1684	6.9	1185	4.8	-	-	2124	8.7	24445
Finch	5811	10.8	27085	50.6	15076	28.1	47972	89.6	1746	3.3	1813	3.4	1779	3.3	230	0.4	53540
Onasbruck	834	7.2	1720	14.8	4517	38.8	7071	60.8	1543	13.3	796	6.8	30	0.2	2185	18.8	11625
Roxborough	1457	2.6	11842	20.9	14460	25.5	27759	49.0	12421	21.9	5540	9.8	174	0.3	10801	19.1	56695
Kenyon	4054	13.4	428	1.4	19546	64.8	24028	79.7	1887	6.2	1220	4.0	526	1.7	2489	8.2	30150
Lochiel	-	-	-	-	386	53.6	386	53.6	161	22.4	51	7.1	-	-	122	16.9	720
Total	89025	9.2	232208	24.0	269336	27.9	590569	61.1	158926	16.4	90063	9.3	34159	3.5	91322	9.4	966400

3. LAND USE IN THE BASIN:

3.1 Agricultural Land Use System

Based on the recent agricultural land use systems mapping prepared by the Foodland Development Branch, Ontario Ministry of Agriculture and Food, under the "FARINEO" program, nearly 60 percent of the land in the Basin is identified with agricultural pursuits. This represents about 584,600 acres and is identified with 6 different major systems, ranging from the monoculture and corn system through the mixed, the hay and the hay-grazing and grazing systems. Two minor systems included under the non-agricultural section comprise the speciality agriculture (market gardens, nurseries and orchards) and sod farms. The other 40 percent of the Basin is utilized by non-agricultural uses such as towns, woodlots and treed areas, forest plantations, swamps, extractive areas, recreational lands, and those lands which are idle and have no apparent use.

Table 3.1 provides an outline of the agricultural land use system classification. Table 3.2 provides an area summary of the agricultural and non-agricultural systems mapped on a Basin and sub-basin basis.

The agricultural system mapping program has indicated that some 26,750 acres are identified with a monoculture system. This monoculture system is essentially a non-rotational cropping system and reflects a continuous system of the same crop year after year. In the Basin, it is predominantly corn. The corn land use system has been mapped over approximately 105,000 acres or about 11 percent of the Basin. This system, while predominantly corn, reflects a rotational pattern with hay and pasture and some grains. In the Basin, indications are that about 60 percent of this system would be in corn, either for silage or grain. The corn system appears to be an integral part of the dairy-livestock operations. The areas mapped under the monoculture and corn

TABLE 3.1

Legend

Agricultural Land Use Systems

Symbol	Land Use System, Type	Description
P	Monoculture	A contiguous arrangement of four or more fields, or a minimum of 16 hectares of corn or small grains.
C	Corn System	A contiguous arrangement of four or more fields of uniform size. 40-75% of the area is corn, the remainder is a mixture of hay, pasture, and sometimes grain.
M	Mixed System	A contiguous arrangement of four or more fields of uniform size. There must be some corn, but less than 40% of the area. The remainder is a mixture of hay, grain and pasture.
H	Hay System	A contiguous arrangement of four or more fields with a mixture of hay, grain, and pasture, the largest portion being hay.
HG	Pasture System	A contiguous arrangement of two or more fields with a mixture of hay and pasture, about equal quantities of each.
G	Grazing System	A contiguous arrangement of four or more fields or a minimum of 16 hectares with no field separation of either permanent pasture or native grass pasture, or a combination. It may have minor amounts (less than 10%) of hay.

Non-Agricultural Land Use Systems

A1	Idle Agricultural Land	Land idle for 1-10 years and in a state of reversion to natural vegetation.
A2	Idle Agricultural Land	Land idle for more than 10 years and supporting native vegetation.

Table 3.1 (Continued)

Symbol	Land Use System, Type	Description
Z	Woodland	Forest cover with a minimum of 45% crown closure density and not less than half a hectare in area.
Zp	Pastured Woodland	Woodlands that are grazed by livestock.
Zr	Reforestation	Land supporting a stand of artificially stocked trees.
B	Built up	Urban related uses.
X	Swamp, Marsh	Supports vegetation characteristic of a depressed and poorly drained area.
E1	Extraction	Sand and gravel pits and quarries.
E2	Extraction	Topsoil removal.
T	Sod Farms	Public or commercial sales.
R	Recreation	Parks, golf courses, campgrounds, etc.
K	Specialty Agriculture	Orchards, market gardens, etc.
W	Water	Rivers, streams, etc.

Table 3.2

SOUTH NATION RIVER BASIN

LAND USE SUMMARY
by sub - basins

Land Use Category	Upper South Nation acres	%	Castor acres	%	Bear Brook acres	%	Payne River acres	%	Scotch River acres	%	Lower South Nation acres	%	Total acres	Basin %	
Agricultural															
P	2971	1.2	8713	4.6	3846	3.2	1097	2.3	1645	2.4	8478	3.0	26750	2.7	P
C	28408	11.1	22522	12.0	7548	6.2	8004	17.0	5996	8.6	32479	11.5	104957	10.9	C
M	52365	20.5	42603	22.6	14092	11.7	9701	20.6	17897	25.7	55261	19.4	191919	19.9	M
H	36500	14.2	37358	19.8	19747	16.4	6180	13.0	19669	28.3	71590	25.1	191044	19.8	H
HG	16974	6.6	7624	4.0	5866	4.9	1706	3.6	3175	4.6	14916	5.2	50261	5.2	HG
G	3149	1.2	5943	3.2	3952	3.3	521	1.1			1474	.5	15039	1.6	G
Sub-totals	140367	54.8	124763	66.2	55051	45.7	27209	57.6	48382	69.6	184198	64.7	579970	60.1	sub total
Non-Agricultural															
A 1	11677	4.6	12946	6.9	5980	5.0	2576	5.5	1293	1.9	9605	3.4	44077	4.6	A-1
A 2	19832	7.8	5121	2.7	3965	3.3	1958	4.2	1395	2.0	7373	2.6	39644	4.1	A-2
Z	72581	28.4	29743	15.8	45225	37.5	13603	28.9	16377	23.5	66054	23.2	243583	25.2	Z
Z p	234	.1	258	.1	227	.2	204	.4	389	.6	457	.2	1769	.2	Z p
Z r	1106	.4	275	.1	500	.4	580	1.2	544	.8	2102	.7	5107	.5	Z r
B	1475	.6	3617	1.9	2626	2.2	268	.6	394	.6	2069	.7	10449	1.1	B
X	6699	2.6	6469	3.4	315	.3	103	.2	69	.1	9716	3.4	23371	2.4	X
E 1	747	.3	2177	1.2	769	.6	219	.5	335	.5	757	.3	5004	.5	E-1
E 2					376	.3	12		83	.1	97		568	.1	E-2
T	465	.2	1097	.6	491	.4					494	.2	2547	.3	T
R	119		616	.3	51		121	.3	65	.1	164	.1	1136	.1	R
K	574	.2	233	.1	562	.5	72	.2			89		1530	.2	K
W	106		140	.1			204	.4	151	.2	1546	.5	2147	.2	W
Unclassified			1134	.6	4364	3.6							5498	.6	Unclass.
Sub-totals	115615	45.2	63862	33.8	65451	54.3	19920	42.4	21095	30.4	100523	35.3	386430	39.9	subtotal
Totals	255982		188589		120502		47129		69477		284721		966400	100.0	total

systems reflect some of the more intensively managed lands in the Basin, as well as those lands which are extensively under "clean" cultivation practices.

The mixed agricultural land use system has been mapped over approximately 192,000 acres, or 20 percent of the Basin. This system reflects the more mixed aspect of the rotational pattern with less extensive areas of corn but with more area in hay. It reflects the more traditional agricultural pattern that is normally encountered with many of the livestock operations in the Basin. Indications are that about 20 percent of the system is in corn with the remainder in grain and hay.

The hay system has been mapped on some 191,000 acres. Lands included in this system are predominantly in hay with some cereals and corn. This system reflects a less intensive agricultural land use associated with extensive types of livestock operations.

The monoculture, corn, mixed and hay systems represent, in general, the "improved" area of the Basin, while the hay/grazing, grazing and idle agricultural land systems constitute, in general, the "unimproved" area of the Basin.

The hay/grazing system has been mapped over 50,200 acres or 5 percent of the Basin. This system appears to be associated with extensive type livestock operations and often with marginal type lands. The grazing system has been mapped over 15,000 acres or 1.6 percent of the Basin. Lands in this category comprise the rough pasture and grazing lands that are normally associated with marginal land resources.

The non-agricultural lands are predominantly made up of woodlands, lands that are idle and have no apparent use, and swamp and marshes. Based on the land use mapping, approximately 243,600 acres, or 25 percent of the Basin are identified with the woodlands. A further 1,800 acres are identified with woodlands that are grazed. Only about 5,100 acres are associated with lands that have been reforested or artificially stocked with trees.

About 23,400 acres were identified with swamp and marshes. In the Basin, these are associated with the "open" or non-treed type of swamp and marshes. Included within this category are major portions of the Alfred bog, the Moose Creek bog, Winchester bog and the Spencerville bog.

Table 3.3 details the acreage of the agricultural land use systems and non-agricultural land use systems by the township area that lies within the Basin.

Table 3.4 presents a summary of the agricultural land use systems, according to intensity of use by the area of the township that lies within the Basin.

While the Basin is endowed with extensive useable lands, they are not without limitations. It has been well demonstrated that those lands suffering from restricted drainage can be dramatically improved through tile drainage and the removal of soil water. Throughout the Basin, extensive areas have been tile drained and reflect a higher productive capability in the land use pattern than is otherwise indicated by the capability data. An assessment and approximation of this improved potential is made in subsequent sections of the report.

The lands which are affected by stoniness have been extensively cleared in order to make them arable. However, this limitation still persists as a problem in that the stoniness re-occurs through the working up by frost action and tillage of the subsoil stones and boulders.

Those lands which suffer from adverse soil structure can be improved through the introduction of drainage and sub-soiling practices to break the dense nature of the subsoil and to initiate

Table 3.3: South Nation River Basin

Acreages of Agricultural Land Use Systems
By Township That Lie Within The South Nation Basin

Township	P	C	M	H	HG	G	Sub-Total	A_1	A_2	Z	Z_p acres	Z_r	B	X	E_1	E_2	T	R	K	W	Not Classified	Total
Gloucester	200	1102	1803	3324	612	1030	8071	2060	2416	7522	-	-	1647	-	1216	-	527	6	236	-	4504	28205
Osgoode	4317	7461	13096	14210	4911	5254	49249	8166	2104	17866	-	126	1137	216	795	-	1061	489	171	-	-	81380
Cumberland	1110	4142	7423	10218	4276	3173	30342	3115	1166	13476	-	77	1173	51	321	301	-	51	308	-	994	51375
Russell	4351	7149	19428	5837	1073	419	38257	2572	1276	5285	234	69	1161	-	274	63	-	96	18	-	-	49305
Clarence	326	2550	9600	10364	2161	-	25001	2969	962	19665	170	282	376	276	112	12	-	-	-	-	-	49825
Cambridge	1145	12962	8938	9160	2909	114	35228	1508	872	26847	-	478	732	-	147	-	-	-	-	623	-	66435
North Plantagenet	854	340	2915	17565	2054	91	23819	1454	1389	13988	163	470	823	150	84	-	-	72	-	163	-	42575
South Plantagenet	1661	3363	12761	15961	2260	-	36006	1320	1687	10319	76	741	354	52	32	-	-	-	64	644	-	51295
Alfred	-	-	588	6985	414	-	7987	474	254	2920	-	74	-	1912	107	13	494	80	-	20	-	14335
Caledonia	418	1188	7559	14679	1560	-	25404	810	916	3372	173	431	105	5806	60	13	-	-	-	-	-	37090
West Hawkesbury	-	-	379	124	-	-	503	-	30	597	-	-	-	-	-	-	-	-	-	-	-	1130
Elizabethtown	-	77	358	154	147	32	768	-	57	1277	32	-	-	134	57	-	-	-	-	-	-	2325
Oxford	-	119	506	1364	767	817	3573	1087	2062	5664	-	176	25	679	12	-	-	-	102	-	-	13380
Augusta	140	3942	7411	2326	1916	415	16150	3060	5712	18806	140	172	619	2786	338	-	-	-	32	-	-	47815
Edwardsburg	448	5478	7084	2735	6768	802	23315	2658	5805	29151	-	334	108	2908	82	-	269	44	25	31	-	64730
South Gower	-	3088	452	1506	-	403	5449	545	805	4551	-	31	31	445	43	-	-	-	100	-	-	12000
Mountain	1913	6589	16371	16837	1762	-	43472	1818	2875	5938	62	170	283	5919	283	-	-	50	94	76	-	61040
Winchester	2593	11784	24317	14177	1887	-	54758	1088	632	4606	189	145	949	108	145	-	-	-	25	-	-	62645
Matilda	1208	7690	8607	15322	3978	487	37292	2896	3181	8125	-	348	-	-	31	-	196	-	271	-	-	52340
Williamsburg	112	3714	7832	2474	3820	318	18270	723	779	4262	44	-	199	81	25	-	-	50	12	-	-	24445
Finch	2866	9730	14678	11375	1896	1509	42054	1826	1834	6846	-	362	244	-	106	12	-	-	-	256	-	53540
Osnabruck	-	851	2044	1236	1267	175	5573	1002	96	4623	-	-	84	-	175	-	-	-	72	-	-	11625
Roxborough	2290	11638	10525	6596	1293	-	32342	2796	2412	15330	440	307	262	1842	473	154	-	133	-	204	-	56695
Kenyon	798	-	7244	6165	2530	-	16737	130	322	12177	46	314	137	6	85	-	-	65	-	131	-	30150
Lochiel	-	-	-	350	-	-	350	-	-	370	-	-	-	-	-	-	-	-	-	-	-	720
Total	26750	104957	191919	191044	50261	15039	579970	44077	39644	243583	1769	5107	10449	23371	5003	568	2547	1136	1530	2148	5498	966400

Table 3. 4: South Nation River Basin

Summary of the Agricultural Land Use Systems By Township That Lie Within The South Nation Basin

Township	Monoculture and Corn System acres	%	Mixed Grain and Hay System acres	%	Hay Grazing and Grazing System acres	%	Specialty Agriculture Nurseries, Sod acres	%	Total acres
Gloucester	1302	14.7	5127	58.0	1642	18.6	763	8.6	8834
Osgoode	11778	23.3	27306	54.1	10165	20.1	1232	2.4	50481
Cumberland	5252	17.1	17641	57.5	7449	24.3	308	1.0	30650
Russell	11500	30.0	25265	66.0	1492	3.9	18	-	38275
Clarence	2876	11.5	19964	79.8	2161	8.6	-	-	25001
Cambridge	14107	40.0	18098	51.4	3023	8.6	-	-	35228
North Plantagenet	1194	5.0	20480	86.0	2145	9.0	-	-	23819
South Plantagenet	5024	13.9	28722	79.6	2260	6.3	64	0.2	36070
Alfred	-	-	7573	89.3	414	4.9	494	5.8	8481
Caledonia	1606	6.3	22238	87.5	1560	6.1	-	-	25404
West Hawkesbury	-	-	503	100.0	-	-	-	-	503
Elizabethtown	77	10.0	512	66.6	179	23.3	-	-	768
Oxford	119	3.2	1870	50.9	1584	43.1	102	2.8	3675
Augusta	4082	25.2	9737	60.2	2331	14.4	32	0.2	16182
Edwardsburg	5926	25.1	9819	41.6	7570	32.1	294	1.2	23609
South Gower	3088	55.6	1958	35.3	403	7.3	100	1.8	5549
Mountain	8502	19.5	33208	76.2	1762	4.0	94	0.2	43566
Winchester	14377	26.2	38494	70.3	1887	3.4	25	-	54783
Matilda	8898	23.5	23929	63.4	4465	11.8	467	1.2	37759
Williamsburg	3826	20.9	10306	56.4	4138	22.6	12	-	18282
Finch	12596	29.9	26053	61.9	3405	8.1	-	-	42054
Onasbruck	851	15.1	3280	58.1	1442	25.5	72	1.3	5645
Roxborough	13928	43.1	17121	52.9	1293	4.0	-	-	32342
Kenyon	798	4.8	13409	80.1	2530	15.1	-	-	16737
Lochiel	-	-	350	100.0	-	-	-	-	350
Total	131707	22.5	382963	65.5	65300	11.2	4077	7.0	584047

water movement. The improved aeration improves the productive capacity of these soils.

The lands which suffer from low inherent fertility are mainly associated with the sandy soils. These lands will require large inputs in fertilizer as well as careful management of the soil-plant moisture relationship. These sandy lands are also prone to wind erosion and, therefore, require continual inputs of good field husbandry practices, as well as irrigation for some crops, and drainage in order to make them more productive.

An examination of the agricultural land use acreage data in Table 3.4 indicates that 131,700 acres or 22.5 percent of the agriculturally used land base is under intensive cropping. This is associated with the monoculture and corn systems. While it is not possible, from the land use data, to indicate the acreage under corn, the major part of these two systems would be predominantly corn.

About 382,900 acres or 65.6 percent of the agriculturally use land is less intensively used and associated with the "traditional" mixed cropping and hay systems. Acreage of corn are included in this group but they comprise mainly cereals and hay. Only 65,300 or 11.0 percent of the agriculturally used land is associated with the more extensive type uses of grazing, with some hay production. Nearly 4,200 acres or 7.0 percent of the agriculturally used land is associated with specialty agriculture, including market gardens, orchards, nurseries and sod farms. Over 2,500 acres of this specialty group are associated with sod farms.

There is considerable variation in the percentage of the various agricultural land use systems within the townships in the Basin. Table 3.4 highlights these variations.

Table 3.5 presents a summary of the area under agricultural use, the area that is presently idle and unused, and the area under woodland and swamps.

This table points up the variation between townships and, therefore, localities within the Basin. In terms of the agriculturally used lands, some townships are extensively used, i.e. Winchester which has over 87 percent of its area in agricultural use, whereas the area of Elizabethtown in the Basin has only 33 percent of its area utilized in agriculture. The percentage of agricultural use provides a basis for ranking the townships and the areas of the Basin as to their importance for agriculture.

An analysis of the woodlands and swamp areas in townships within the Basin is also widely varying; these also help to characterize the different parts of the Basin. In Elizabethtown over 62 percent of the land that lies within the Basin is in woodland and swamp; Winchester Township has only 8 percent of its land area in woodland and swamp.

The pattern and amount of idle or unused land in the Basin is also quite variable. Oxford Township has a high of 23.5 percent of its land area idle, whereas the areas of Lochiel and Kenyon Townships within the Basin have virtually no lands, or very little land, idle. This distribution pattern reflects, in part, those townships which are being influenced by urban pressures, development and speculation, and, in part, those where agriculture is being abandoned due to the marginal nature of the land. Also included in this category are lands which have been left idle due to a social or legal condition.

The areas of idle land are important in the land use planning of the Basin, in that they constitute a reserve which remains for the present uncommitted. In some cases, these idle lands are reverting back to natural vegetation, and in time would be recognized as woodlands. These lands, depending on their capability, size and location, have

Table 3.5: South Nation River Basin

Summary of Agricultural Land Use, Idle Land and Woodland-Swamp Acreage By Township That Lie Within the South Nation Basin

Township	Area of Township[1] Under Agricultural Use[2]	%	Area of Township Currently Idle	%	Area of Township Under Woodland Swamp[3]	%
	acres		acres		acres	
Gloucester	8834	37.2	4476	18.8	7522	26.6
Osgoode	50481	62.0	10270	12.6	18208	22.4
Cumberland	30650	59.6	4281	8.3	13604	26.5
Russell	38275	77.6	3848	7.8	5588	11.3
Clarence	25001	50.2	3931	7.9	20393	40.9
Cambridge	35228	53.0	2380	3.6	27325	41.1
North Plantagenet	23819	55.9	2843	6.7	14771	34.7
South Plantagenet	36070	70.3	3007	5.8	11188	21.8
Alfred	8481	59.1	728	5.1	4906	34.2
Caledonia	25404	68.5	1726	4.6	9782	26.4
West Hawkesbury	503	44.5	30	2.6	597	52.8
Elizabethtown	768	33.0	57	2.4	1443	62.1
Oxford	3675	27.5	3149	23.5	6519	48.7
Augusta	16182	33.8	8772	18.3	21904	45.8
Edwardsburg	23609	36.5	8463	13.1	32393	50.0
South Gower	5549	46.2	1350	11.2	5027	41.9
Mountain	43566	71.3	4693	7.6	12089	19.8
Winchester	54783	87.4	1720	2.7	5048	8.0
Matilda	37759	72.1	6077	11.6	8473	16.2
Williamsburg	18282	74.7	1502	6.1	4387	17.9
Finch	42054	78.5	3660	6.8	7208	13.5
Onasbruck	5645	48.5	1098	9.4	4623	39.7
Roxborough	32342	57.0	5208	9.2	17919	31.6
Kenyon	16737	55.5	452	1.5	12543	41.6
Lochiel	350	48.6	-	-	370	51.4
Total	584047	60.4	83721	8.6	273830	27.5

[1] Area of use within the portion of the township in the Basin.

[2] Derived for agricultural land use system mapping - FARINEO Program.

[3] Includes woodlands, woodlands that are grazed, reforestation areas and swamps.

potential for other opportunities, such as the increase of the agricultural base area or for reforestation or other uses.

In a general way, the agricultural land uses appear to be nearly in balance with the capability of the land, in that 61 percent of the Basin is composed of lands suited to sustained agricultural production and 60 percent of the lands in the Basin is being utilized in agricultural production. The area in idle lands suggests that there are opportunities for the expansion and the re-allocation of resources, and that major land use conflicts can be minimized.

Agricultural land use patterns will continue to change as opportunities present themselves and are developed. The pattern of intensification will continue as management systems improve. There is no doubt that agricultural production in the Basin will increase, primarily through improvements to the quality of land by tile drainage, crop improvement, better field husbandry practices, and more effective marketing.

3.2 Land Use -- Land Capability Correlation

Previous examinations of land capability have identified that over 61 percent of the Basin is composed of lands which are potentially well suited to agriculture (namely Classes 1, 2 and 3) and that a further 25 percent are marginally suited to agriculture. The agricultural land use mapping program has shown that 60 percent of the Basin is agriculturally used. In a correlation of the agricultural land use systems mapping with agricultural land capability mapping, it is evident that all of the agricultural uses are not always associated with the best agricultural land. This is due to the structural layout of farms, homesteads, farm woodlots and the inclusion of recreational lands, roads, railways and urban communities on lands that potentially have a high capability for agricultural production. Further, some parts of the Basin are not as well endowed with good agricultural soil resources, with the result that lower quality lands have been utilized in the creation of the farm structure and the rural land use pattern.

Time and budget did not permit, nor was it felt justified to carry out a full scale cross correlation of the data. The "FARINEO" program is proposing to do this when all of the data has been digitized from the agricultural land use system mapping and the Canada Land Inventory agricultural capability mapping. However, it is understood that this will not be available until late 1981 or early 1982.

In order to provide some analysis of the agricultural land use and agricultural capability data, a "screening" assessment was carried out. The various land classes and subclasses were, on a township basis, correlated with the agricultural land uses, and the percentage utilization estimated. This approximation was used in the development of acreage data of the agricultural use on the land capability classes and subclasses. In the assessment of units with a complex capability symbol, the utilization was proportioned and allocated to the various classes and subclasses.

Table 3.6 presents the estimates of agricultural land uses by classes and subclasses. The total acreage of agricultural use derived approximates the agricultural land use total obtained from the measurement of the agricultural land use systems mapping.

In general, the analysis shows that good agricultural lands are extensively committed to agricultural uses. The present land use pattern would indicate that it is not possible to increase the area of agricultural use on the higher capability lands. It appears that the 85 percent utilization is a reasonable expectation for the high capability lands, i.e. Class 1 and 2, given the structural characteristics of the farmsteads and woodlots and the competing uses of roads and communities. The utilization pattern on Class 3 lands is more variable, and influenced by the nature of the limitation. The results suggest that some of the lands accorded a Class 3 capability (in particular the

Table 3.6: South Nation River Basin

Agricultural Assessment
Estimated Agricultural Land Use By Land Capability Classes and Sub-classes

Land Class	Acres	Estimated %[1] In Agriculture	Estimated Acres In Agricultural Use
1	89025	85	75671
2w	139147	85	118275
2p	1275	80	1020
2d	31253	85	26565
2f	55762	75	41821
2fm	3736	85	3176
2fw	1035	85	880
Sub-total	232208	82.5	191767
3f	55899	75	41924
3w	125248	85	106460
3s	63	80	50
3d	27046	70	18932
3r	8523	20	1705
3p	52065	55	28636
3i	419	85	356
3fm (3s)	73	75	55
Sub-total	269336	73.5	198118
4w	5776	30	1733
4f	25528	50	12764
4s	4879	10	488
4r	6314	50	3157
4fm	73783	50	35891
4ws	42646	10	4265
Sub-total	158926	37.3	59298
5w	64853	20	12970
5i	1939	60	1163
5p	918	50	459
5sw	22216	10	2222
5fm	139	50	69
Sub-total	90063	18.7	16883
6w	188	75	141
6p	9349	80	7479
6r	16307	25	4077
6wp	851	5	42
6wf	7189	10	719
Sub-total	33884	36.8	12458
7p	275	50	136
0	91322	30	27396
Total	965039		581697
Water	1361		
Grand Total	966400		

[1] Estimate based on a comparative analysis of The "FARINEO" Agricultural Land Use System maps at 1:50,000 scale of the portion of the township within the South Nation Basin and the 1:50,000 scale Canada Land Inventory provincial manuscript maps of soil capability for agriculture.

subclass 3r) have limitations which appear to be more severe than expressed in the approximation done under the Canada Land Inventory Program. Based on the data, it appears possible to expand the acreage in agricultural land uses within the Class 3 group lands; however, the limitations indicated that this will require inputs of fertilizers, stone removal, drainage and soil moisture management.

Similar patterns exist for capability Classes 4, 5 and 6. The high utilization of some of the subclasses in the lower capability classes indicates that some of these lands are within an existing farm structure and, because they represent minor elements, have been improved so as to enlarge the arable farm area. Also, the adjustment of the data from land capability complex have resulted in an increase.

Needless to say, that in utilizing the Canada Land Inventory data, considerable caution must be taken in the interpretation of this data for planning purposes, and for the development of policies based upon it.

4. LAND DRAINAGE IN THE BASIN:

4.1 Inventory of Tile Drainage

Land drainage is an important aspect in the Basin because of its specific relationships to land utilization, land capability and production potential. Because of its importance, the current status has been included within the Land Use section of the report.

Land drainage has two main components, namely surface water removal and soil water removal. The first is primarily related to and a function of the removal and disposal through the improvement of main drainage systems and drainage ditches. While soil water removal and disposal is dependent on the drainage ditches and main drains for outlets, it is primarily related to tile drainage and the improvement of soil aeration.

The following assessment deals primarily with tile drainage. The surface water drainage is more aptly discussed and dealt with under the hydrologic and water regime section of the overall study program and is not discussed in this report.

There can be no doubt that tile drainage is vital to the improved agricultural production of many lands in the Basin. The Foodland Development Branch of OMAF, under the "FARINEO" program has been carrying out an "in depth" assessment of the tile drainage situation in eastern Ontario. A systematic inventory was carried out with properties that were tile drained being indexed by lot and concession. Data on the acreage, outlets and when the tile drainage was installed were also collected. The Foodland Development Branch had also embarked on a correlation of the areas of tile drainage with the agricultural land use system maps and the Canada Land Inventory soil capability maps for agriculture. Our study completed this program for areas within the Basin that were not done, in order to present a comprehensive picture.

Unfortunately, no data was gathered for Elizabethtown Township in the County of Leeds as this was outside the "FARINEO" study area.

The tile drainage areas were compiled on 1:25,000 scale lot and concession plans for each township and these form the official record. These data were subsequently recompiled on overlays to the 1:50,000 scale topographic map sheets and numbered. The 1:50,000 scale tile drainage overlays were overlaid with the 1:50,000 scale Canada Land Inventory soil capability maps to tabulate the drained land classes. A similar exercise was carried out with the agricultural land use systems maps to tabulate the land use categories that were drained. These data were compiled by township and for the Basin.

The data on the dates of installation of the drainage systems were also compiled. It was found that the reliability of the dates earlier than 1977 was questionable, hence any installations prior to 1977 have been grouped. Further, the acreage data for 1980 is not complete as the field survey was finished in August, 1980.

The results of the tile drainage survey indicate that there is just over 78,000 acres in the Basin that have been tile drained. This represents 8.1 percent of the Basin area. In terms of the agriculturally used land, it represents 13.3 percent.

Table 4.1 presents a detailed inventory of the acreage of tile drainage cross-correlated with agricultural capability land classes and subclasses for townships that lie within the South Nation River Basin.

An analysis of Table 4.1 shows that tile drainage is found on all classes of land. This is due to the fact that tile drainage systems are laid out in a systematic manner and cut across soil types

Table 4.1: South Nation River Basin

Area Tiled Drained [1] Cross-Classified By Land Class and Sub-class [2] By Township Area Within the South Nation Basin

Township	Agricultural Land Class and Sub-classes																									
	1	2w	2f	2d	2fw	2fm	3w	3f	3r	3e	3p	3d	4w	4f	4r	4wa	4fm	5w	5t	5p	5aw	6p	6r	6wp	6wf	0	Total
															acres												
Gloucester	70	40	545	30	-	-	200	-	-	-	20	86	-	140	-	-	-	-	-	-	-	-	-	-	-	-	1131
Osgoode	3291	691	111	20	-	-	870	-	-	-	496	-	-	74	20	-	145	411	-	-	-	21	-	-	-	18	6168
Cumberland	317	-	128	730	-	-	3475	5	-	-	230	-	-	-	-	25	357	-	-	-	-	-	90	-	-	166	5523
Russell	545	870	2296	-	-	-	1328	225	-	-	117	-	-	-	-	-	65	-	-	-	-	-	-	-	-	-	5446
Clarence	20	-	21	148	-	-	512	15	-	-	9	-	-	-	-	181	19	-	-	-	28	1	-	-	-	-	954
Cambridge	29	3135	330	-	238	-	122	43	-	-	-	-	-	-	-	43	-	-	-	-	-	24	-	24	-	7	3995
North Plantagenet	-	-	-	51	-	-	26	-	-	-	-	-	-	137	-	-	30	-	-	-	-	-	-	-	-	-	244
South Plantagenet	-	112	194	202	-	-	3212	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	10	-	20	53	3903
Alfred	-	-	-	-	-	-	176	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	176
Caledonia	6	243	51	23	-	-	1782	-	-	-	17	-	-	40	-	-	10	-	-	-	-	1	-	-	-	474	2647
West Hawkesbury	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Elizabethtown	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oxford	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Augusta	72	188	-	-	-	-	416	27	-	48	21	-	49	-	-	-	13	52	16	-	-	-	149	-	-	70	1121
Edwardsburg	579	90	-	-	-	96	105	298	-	-	222	-	10	-	-	-	82	290	-	10	-	12	-	-	-	55	1849
South Gower	35	34	-	-	-	6	-	20	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	114
Mountain	1358	3839	-	-	-	255	326	346	-	-	358	41	-	-	-	-	85	2175	-	-	-	-	-	-	-	67	8850
Winchester	1540	4623	-	844	-	-	1752	87	20	-	368	841	36	-	-	-	70	742	-	-	-	-	-	-	-	700	11623
Matilda	461	4615	-	121	-	-	289	469	-	-	152	193	15	-	-	-	20	135	-	-	-	-	-	-	-	-	6470
Williamsburg	219	1564	-	144	-	-	401	-	-	-	54	490	13	-	-	-	-	222	-	-	-	-	-	-	-	58	3165
Finch	610	6146	-	363	-	-	370	85	-	-	198	660	15	20	-	-	185	83	-	-	-	-	-	-	-	29	8764
Osnabruck	16	58	-	22	-	-	16	35	-	-	23	57	-	-	-	-	21	56	-	-	-	-	-	-	-	-	304
Roxborough	70	1367	-	89	-	-	127	303	9	-	107	81	-	-	-	-	565	229	-	-	-	-	-	-	-	293	3240
Kenyon	178	37	-	-	-	-	1171	344	-	55	375	-	-	-	-	-	92	12	-	-	-	17	-	-	-	16	2297
Lochiel	-	-	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22
Total	9416	27654	3676	2787	238	357	16698	2302	29	103	2784	2449	138	411	20	349	1759	4407	16	10	28	76	249	24	20	2006	78006

[1] Data obtained from Foodland Development Branch, Ontario Ministry of Agriculture and Food, FARINEO Program.

[2] Where tile drainage occurred on complex land classification units, areas was adjusted for the proportion of each and added to the subclass.

ND No Data.

and hence land classes. The table shows the distribution within townships of the Basin, as well as the distribution within capability classes. The main land classes and subclasses being drained are Classes 2w and 3w. These two land classes comprise the North Gower clay loam soils and the Bearbrook clay soils, both important agriculturally. With tile drainage on these soils, a wider range of crops can be grown more successfully, there is a marked increase in their productive capacity, and they can be worked more easily and earlier.

The large area of Class 1 lands drained in Osgoode Township comprises the Carp clay loam soil and some of the Grenville soils. The large area of Class 2f land in Russell Township that is drained is associated with the Castor fine sandy loam soil. This soil is imperfectly drained and often lensed, and benefits from subsurface drainage.

The acreage of 2d lands tile drained in Cumberland Township and Winchester Township are associated with the Wendover clays, and the Wolford clay loam. Both these soils have restrictive subsoil conditions which can be ameliorated through tile drainage and subsurface tillage.

The extensive area of Class 5w land and organic soils that are being drained in Winchester Township are associated with the shallow Belmeade mucks and the organic soils east of Winchester.

Other large areas of organic soils which have benefited from drainage are the lands east of St. Isidore de Prescott in Caledonia Township.

Table 4.2 presents a detailed inventory of the acreage of tile drainage cross-correlated with the agricultural land use systems for townships within the South Nation River Basin area.

In the Basin, 34.7 percent of the tile drainage is associated with the mixed agricultural land use system, while 30.7 percent is found

Table 4.2: South Nation River Basin

Area Tiled Drained[1] Cross-Classified By Agricultural Land Use Systems Mapping By Township That Lie Within the South Nation Basin

Townships	Agricultural Land Use Systems Classification[2]							Unclassified[3]	Total Tile Drained
	P Monoculture System	C Corn System	M Mixed System	H Hay System	HG Pasture System	K Specialty Agriculture	A Idle Land		
				acres					
Gloucester	-	170	245	50	300	-	70	296	1131
Osgoode	1849	1346	2146	428	286	62	51	-	6168
Cumberland	520	1903	1746	795	434	-	125	-	5523
Russell	830	1850	2325	243	64	-	134	-	5446
Clarence	53	159	406	315	10	-	11	-	954
Cambridge	634	2299	574	346	142	-	-	-	3995
North Plantagenet	99	25	-	82	38	-	-	-	244
South Plantagenet	-	845	2365	680	-	-	13	-	3903
Alfred	-	-	-	176	-	-	-	-	176
Caledonia	12	318	1102	1194	21	-	-	-	2647
West Hawkesbury	-	-	-	-	-	-	-	-	-
Elizabethtown	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oxford	-	-	-	-	-	-	-	-	-
Augusta	90	347	621	11	-	-	52	-	1121
Edwardsburg	55	997	362	130	293	-	12	-	1849
South Gower	-	69	-	25	-	-	20	-	114
Mountain	1360	1963	2788	2434	96	29	180	-	8850
Winchester	1647	4471	4308	1094	77	-	26	-	11623
Matilda	671	1862	1630	1970	83	-	254	-	6470
Williamsburg	40	1072	1249	394	398	-	12	-	3165
Finch	1571	2743	3167	1065	203	-	15	-	8764
Onasbruck	-	166	76	37	25	-	-	-	304
Roxborough	593	1378	656	371	84	-	158	-	3240
Kenyon	419	-	1362	500	16	-	-	-	2297
Lochiel	-	-	-	22	-	-	-	-	22
Total	10443	23983	27128	12362	2570	91	1133	296	78006

[1] Data obtained from the Foodland Development Branch, Ontario Ministry of Agriculture and Food, FARINEO Program.

[2] Agricultural Land Use Systems Classification

[3] Area unclassified within the basin part of the National Capital Commission Area

ND No Data.

under the corn agricultural land use system. Nearly 16 percent of the tile drained land is associated with the hay agricultural land use system and just over 13.0 percent is identified with the monoculture system. 3.0 percent of the hay-grazing system is tile drained. Only a very small acreage of tile drainage is identified with specialty agriculture.

Of particular significance is the amount of tile drainage that has been identified with lands that are idle. There is no apparent indication that these lands have been made idle due to a failure in the tile drainage system but are believed to be due to poor maintenance of outlet drains and social conditions and are only temporarily idle.

Table 4.3 provides a summary of the acreage and percentage of the township area that lies within the Basin that is tile drained. It also presents a summary of the acreage and percentage of the lands under agricultural use (land use systems, P, C, M, H, H/G, G, K and T) within each township in the Basin that is tile drained.

The Townships of Winchester, Finch and Mountain rank the highest with over 20 percent of their agriculturally used area under tile drainage. The Townships of Matilda and Williamsburg are also important and, with the above-mentioned townships, comprise a nucleus in the south central part of the Basin. Another nucleus occurs in Cumberland and Russell townships.

4.2 Drainage Potential

As part of the background studies into the agriculture of the Basin, an assessment was made of the drainage potential to determine which of the lands presently farmed or utilized in agricultural production could benefit from tile drainage.

Table 4.3: South Nation River Basin

Area Drainage Analysis of Townships In The South Nation Basin

Township	Area of Township In Basin	Area Tiled Drained[1]	% of Township Tiled	Area of Township In Basin Under Agricultural Use	% of Agricultural Used Area In Basin Tiled
	acres	acres		acres	
Gloucester	28205	1131	4.0	8834	12.8
Osgoode	81380	6168	7.6	50481	12.2
Cumberland	51375	5523	10.7	30650	18.0
Russell	49305	5446	11.0	38275	14.2
Clarence	49825	954	1.9	25001	3.8
Cambridge	66435	3995	6.0	35228	11.3
North Plantagenet	42575	244	0.6	23819	1.0
South Plantagenet	51295	3903	7.6	36070	10.8
Alfred	14335	176	1.2	8481	2.1
Caledonia	37090	2647	7.1	25404	10.4
West Hawkesbury	1130	-	-	503	-
Elizabethtown	2325	n.d.	-	768	-
Oxford	13380	-	-	3675	-
Augusta	47815	1121	2.3	16182	6.9
Edwardsburg	64730	1849	2.8	23609	7.8
South Gower	12000	114	0.9	5549	2.0
Mountain	61040	8850	14.5	43566	20.3
Winchester	62645	11623	18.6	54783	21.2
Matilda	52340	6470	12.4	37759	17.1
Williamsburg	24445	3165	12.9	18282	17.3
Finch	53540	8764	16.4	42054	20.8
Onsabruck	11625	304	2.6	5645	5.4
Roxborough	56695	3240	5.7	32342	10.0
Kenyon	30150	2297	7.6	16735	13.7
Lochiel	720	22	3.0	350	6.3
Total	966400	78006	8.1	584047	13.3

[1] Area tiled drained to August 1980.

n.d. No data.

Utilizing data developed from the land capability-land utilization assessment and the data from the tile drainage study, figures were derived indicating the amount of land in the various classes and subclasses that were utilized and tile drained.

Table 4.4 details the land capability classes, the acreage under agricultural utilization, the area that has been tile drained and the percentage of the land class utilized that is tile drained.

Utilizing the data from Table 4.4, acreages of the land classes which would benefit from tile drainage were tabulated. The figures expressed present realistic estimates that are based on current utilization of land. A more optimistic estimate could be made if all the acreage within the capability classes requiring tile drainage were incorporated. This would require the removal of farm woodlots and other woodlands to bring these lands into agricultural production.

Table 4.5 summarizes the acreages of the various land capabilities that are currently utilized that would benefit from tile drainage and should be drained. Most of these have been identified by the subclass characteristic of excess wetness. However, also included are those lands which have a structural problem and/or a "pan" formation that affects the internal drainage and the free movement of water. These soils can be improved with tile drainage which opens up the soil and helps the process of developing soil structure and a better rooting zone. The soils with capabilities designated 2f have also been included. These lands comprise the Castor silt loam soils, which are stratified or lensed soils developed from deltaic lacustrine sediments. They are, in general, imperfectly drained but have some poorly drained sections. These soils can be improved through the installation of tile drainage.

Within the Basin there are still some 273,500 acres that are currently being utilized for agricultural production which could be improved by tile drainage and brought up to or nearly to the productive

Table 4.4: South Nation River Basin

Percentage of Lands Utilized In Agriculture Use That Are Tile Drained By Agricultural Land Classes and Sub-Classes

Land Class and Sub-Class	Acres Utilized In Agriculture	Acres Tile Drained	Percentage of Acres Utilized That Are Tile Drained
1	75671	9416	12.4
2w	118275	27654	23.4
2fw	880	238	27.0
2d	26565	2787	10.5
2p	1020	-	-
2f	41821	3676	8.8
2fm	3176	357	11.2
Sub-total	191737	34712	18.2
3w	106460	16698	15.7
3d	18932	2449	12.9
3f	41924	2302	5.5
3r	1705	29	1.7
3p	28636	2784	9.6
3i	356	-	-
3s	105	103	98.1
Sub-total	198118	24365	12.3
4w	1733	138	7.9
4ws	4265	349	8.1
4f	12764	411	3.2
4fm	35891	1759	4.9
4s	488	-	-
4r	3157	20	0.6
Sub-total	59298	2677	4.5
5w	12970	4407	33.9
5sw	2222	28	1.3
5i	1163	16	1.4
5p	459	10	2.2
5fm	69	-	-
Sub-total	16883	4461	26.4
6w	141	-	-
6wp	42	24	57.1
6wf	719	20	2.8
6p	7479	76	-
6r	4077	249	6.1
Sub-total	12458	369	2.9
0	27396	2006	7.3
7p	136	-	-
Total	581697	78006	13.4

Table 4.5: South Nation River Basin

Summary of The Area of Land Classes and Sub-Classes Which Would Benefit From Tile Drainage

Land Class and Sub-Class	Area Presently Utilized In Agricultural Production acres	Acres Tile Drained	Percentage of Land Class Tile Drained	Area Presently Under Agricultural Production Requiring Tile Drainage acres	Percentage of Total Area Requiring Tile Drainage
2w	118275	27654	23.4	90621	32.2
2fw	880	238	27.0	642	0.2
2d	26565	2787	10.5	23778	8.5
2f	41821	3676	8.8	38145	13.9
Sub-total	187541	34355	18.3	153186	54.8
3w	106460	16698	15.7	89762	32.8
3d	18932	2449	12.9	16483	5.9
Sub-total	125392	19147	15.3	106245	38.7
4w	1733	138	7.9	1595	0.5
4ws	4265	349	8.1	3916	1.4
Sub-total	5998	487	8.1	5511	2.9
5w	12970	4407	33.9	8563	2.1
Total	331901	58396	17.6	273505	100.0

capacity of the Class 1 lands. Approximately 55 percent of these are identified with Class 2 lands, 39 percent or 106,000 acres with Class 3, and 5 percent with Classes 4 and 5, 55,000 acres and 8,500 acres respectively.

The organic soils have not been included in the list on Table 4.5 although some 2,000 acres are currently being drained and there are some 27,400 acres estimated as being utilized in agricultural production. The area east of Winchester and the land east of St. Isidore de Prescott are examples of this. The future extension of the agricultural area into the organic soils is a sensitive one because of the environmental impact associated with wildlife, plant species and hydrologic regimes. There is no doubt that parts of these areas can be utilized and made productive but only through high capital costs in water control, management, fertilizers and intensive field husbandry practices.

In order to obtain some measure on the annual increment and trends in drainage installations, an assessment was made of the tile drainage records to ascertain how many acres per year have been installed. The data were obtained from the index cards on tile drainage held by the Foodland Development Branch. Tabulations were prepared for each of the townships, showing the amount of land within the Basin drained in 1977, 1978, 1979 and 1980. Information on dates of installation prior to 1977 was less precise due to the recall factor. The data for 1980 is based on only part of a full season, hence the total figures are on the low side.

Table 4.6 details the acreages of tile drainage installed prior to 1977 and for the years 1977, 1978, 1979 and 1980 by townships that lie within the Basin area.

The trend in tile drainage indicates a significant increase after 1977 when just over 6,600 acres were installed. The trend peaked

Table 4.6: South Nation River Basin

Annual Increment of Acreage Under Tile Drainage[1] Within Township In The South Nation River Basin

Township	1976 & before	1977	1978	1979	1980 [2]	Total
			acres			
Gloucester	375	100	86	120	450	1131
Osgoode	3869	703	788	541	267	6168
Cumberland	3984	263	545	597	134	5523
Russell	3452	117	837	777	263	5446
Clarence	526	35	85	223	85	954
Cambridge	1640	496	705	598	556	3995
North Plantagenet	174	58	12	-	-	244
South Plantagenet	1676	328	992	749	158	3908
Alfred	95	-	55	26	-	176
Caledonia	627	256	626	746	392	2647
West Hawkesbury	-	-	-	-	-	-
Elizabethtown	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Oxford	-	-	-	-	-	-
Augusta	915	33	97	35	41	1121
Edwardsburg	1002	165	205	280	197	1849
South Gower	39	30	45	-	-	114
Mountain	4982	774	738	1057	1299	8850
Winchester	7443	866	1723	756	835	11623
Matilda	3158	661	791	934	926	6470
Williamsburg	1542	334	695	567	27	3165
Finch	4621	977	1518	885	763	8764
Onasbruck	147	16	41	90	10	304
Roxborough	1703	121	548	548	320	3240
Kenyon	944	309	447	444	153	2297
Lochiel	-	-	22	-	-	22
Total	42914	6642	11601	9973	6876	78006

[1] Data derived from Foodland Development Branch, Ontario Ministry of Agriculture and Food, FARINEO Program.

[2] Data for 1980 is for period to end of August 1980.

n.d. -no data

in 1978 at over 11,600 acres and has settled to just over 10,000 acres in 1979. The 1980 figure is expected to approximate the 1979 figure.

In projecting this installation rate into the future, a reasonable expectation of about 28 years would bring all of the lands which would benefit from tile drainage under command. However, depending on the subsidy programs available, such as BILD, it is possible that this 28 year projection could be significantly decreased. Most of the subsurface drainage being installed today is of plastic tubing type; there has been no clay tile laid for 3 to 5 years in Eastern Ontario.

The techniques and equipment for installing plastic tubing are becoming more sophisticated with the result that the installation is more rapid and there is less disturbance to the field.

5. AGRICULTURAL ENVIRONMENT:

5.1 Effects of Flooding on Agriculture in the Basin

Spring flooding is an annual occurrence within the Basin; it generally peaks between mid-March and mid-April. Late spring and fall floods are also possible but are minor in scale. The 1948 South Nation Conservation Report identified two flood prone zones, namely the Brinston and the Plantagenet. A more recent study has identified two additional areas: one on the Bear Brook east of Carlsbad Springs, and the other on the Castor River near the Town of Vernon. Figure 4 shows the location and extent of the flood zones. The Brinston and Plantagenet zones are the major flood areas, while the Bear Brook and Vernon zones are minor in comparison with the other two.

The earlier reports indicate that up to 15,000 acres in the Brinston area and 19,000 acres in the Plantagenet area are affected by floods. To define the flood limits more precisely, a study was undertaken by Delcan to prepare maps of the flood area utilizing a modelling procedure. Maps at the scale of 1:10,000 for the four flood prone areas were prepared which show the extent of flooding for three flood return intervals. These are the 1:1.1, the 1:5 and the 1:100 year flood return interval. These calibrated lines were derived from an hydraulic computation utilizing the HEC II backwater program.

For the purpose of this assessment, the flood lines identified by the interim flood plain mapping have been used to define the flood limits of the agriculturally affected area.

The 1:100 flood line was taken as being representative of the highest or maximum type flood and the 1:1.1 flood line as the lowest or minimum type flood. It was noted that there is very little difference in area flooded between the 1:5 year flood and the 1:100 year flood.

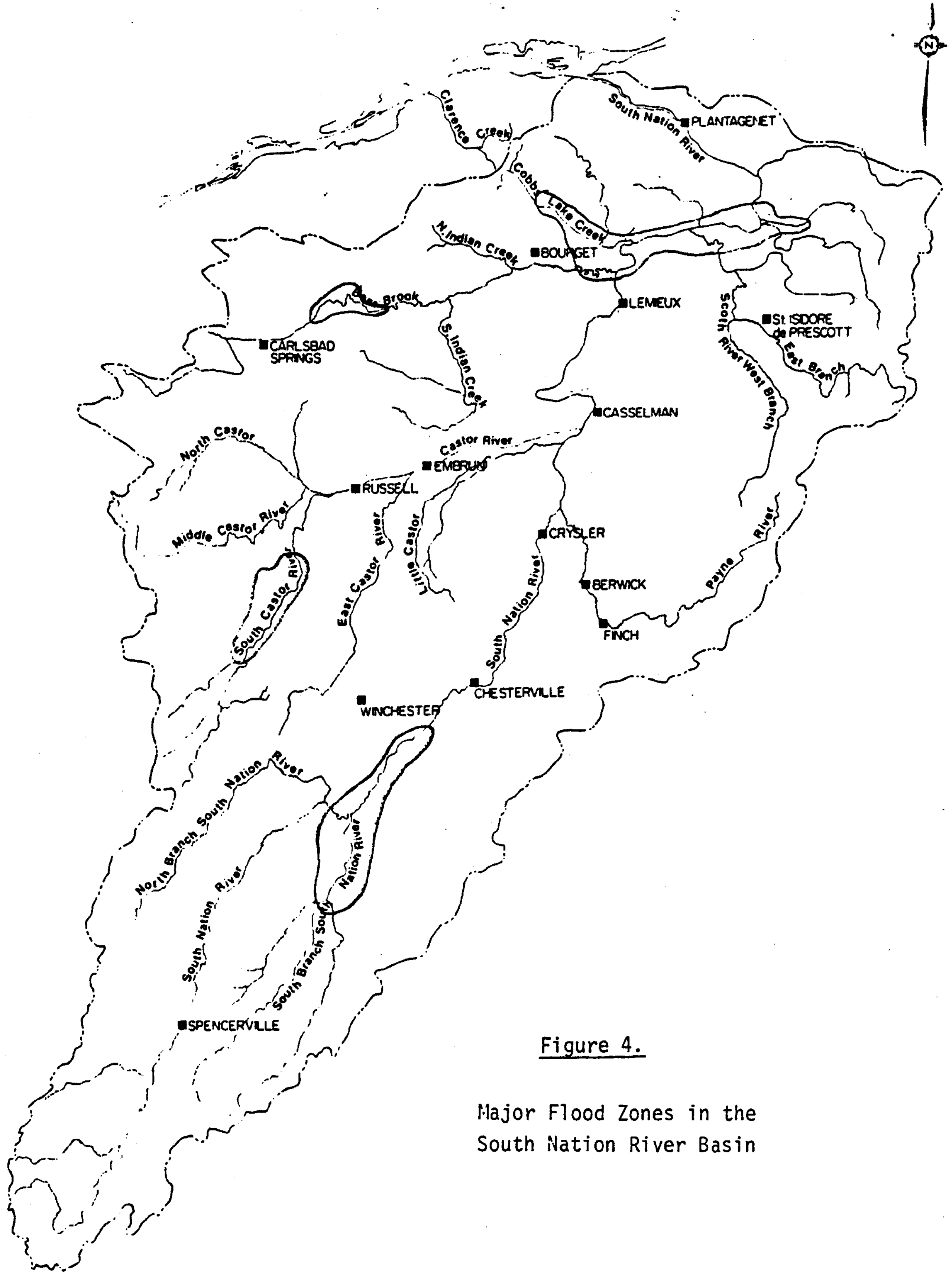

Figure 4.

Major Flood Zones in the South Nation River Basin

The flood lines were plotted on overlays to the 1:50,000 scale base map. A cross correlation was carried out for the 1:1.1 flood limit and the 1:100 flood limit with the Canada Land Inventory agricultural land capability mapping to determine what types of lands were being flooded, and with the agricultural land use systems mapping done under the "FARINEO" program to determine what types of agricultural land use systems were being affected by flooding. The areas of the land classes and subclasses and the land use systems were determined by a dot grid planimeter.

The flood line mapping at 1:10,000 scale prepared for the flood zones had their upstream and downstream limit defined by study limits. The flood zones were arbitrarily closed off just beyond the study limits. A field survey of these areas was undertaken to identify problems and a number of local residents were interviewed to obtain their views and experience with flooding.

The acreages of lands affected in the four flood prone zones for the 1:1.1 and the 1:100 year floods is shown in Table 5.1.

TABLE 5.1

Acres of Land Affected Under the 1:1.1 and 1:100 Year Flood

Flood Prone Zone	1:1.1 Flood Acres	1:100 Flood Acres	Ratio
Brinston-Chesterville	4,600	11,400	1:2.5
Plantagenet	3,800	15,300	1:4.0
Bear Brook	500	1,800	1:3.6
Vernon	300	2,000	1:6.3
Totals	9,200	30,600	3.3

Acreages for the 1:5 year flood were not measured as they approximated fairly closely the 1:100 year flood. Acreage differences between the 1:5 and 1:100 year stage were reported on in the Delcan study and are as follows:

Flood Prone Zone	Acres	Percent of the 1:100 Flood Acreage
Brinston-Chesterville	780	15.6
Plantagenet	1,800	11.7
Bear Brook	1,100	6.1
Vernon	270	13.5

SOURCE: Delcan Report

The 1:1.1 type flood affects a little over 9,000 acres, or less than 1 percent of the Basin; the 1:100 flood can affect more than three times that area or just over 3 percent of the Basin area. The acreages affected by the 1:100 year flood are considerably less than originally reported.

Table 5.2 details the acreage of land classes and subclasses that would be affected by the 1:1.1 year flood and the 1:100 year flood.

The lands within the Brinston-Chesterville flood zone are predominantly composed of good agricultural land, mainly Class 2. The lands within the Plantagenet flood zone are composed of lower quality lands (mainly Class 3) with extensive areas of organic soils. Within the Bear Brook flood zone, the major part is composed of Class 3 lands, while in the Vernon flood zone the major land class is 5.

Table 5.3 details the acreage of the agricultural land use systems that would be affected by the 1:1.1 and 1:100 year flood. Within all of the flood prone areas agriculture is the dominant land use, with more than 80 percent of the lands at either stage being in agricultural use. A relatively small percentage of the lands in the Brinston and Plantagenet flood zones are in woodland. The proportion of woodlands in the Bear Brook and Vernon flood zones are much larger.

While there are variations in the proportion of the different land use systems within the four flood zones, only the land uses associated

Table 5.2: South Nation River Basin

Flood Zone Assessment By Agricultural Capability Classes and Sub-Classes

Land Class and Sub-Class	Chesterville-Brinston Flood Zone				Plantagenet Flood Zone				Bear Brook Flood Zone				Vernon Flood Zone				Total 1:1.1		Total 1:100	
	1:1.1 acres	%	1:100 acres	%	1:1.1 acres	%	1:100 acres	%	1:1.1 acres	%	1:100 acres	%	1:1.1 acres	%	1:100 acres	%	acres	%	acres	%
1	300	6.6	603	5.2	-	-	-	-	-	-	26	1.4	11	3.5	59	3.0	311	3.4	688	2.3
2w	4218	92.2	10704	93.2	-	-	-	-	-	-	-	-	-	-	31	1.6	4218	46.1	10735	35.2
2d	-	-	6	0.1	-	-	250	1.6	12	2.4	50	2.8	-	-	-	-	12	0.1	306	1.0
2f	-	-	-	-	-	-	187	1.2	-	-	-	-	-	-	-	-	-	-	187	0.6
Sub-total	4218	92.2	10710	93.3	-	-	437	2.8	12	2.4	50	2.8	-	-	31	1.6	4230	46.2	11228	36.8
3w	-	-	-	-	1906	50.5	9818	64.3	461	91.5	1576	87.6	-	-	-	-	2367	25.8	11391	37.3
3d	18	0.4	56	0.5	-	-	-	-	-	-	-	-	-	-	-	-	18	0.2	56	0.2
3f	-	-	-	-	-	-	93	0.6	-	-	-	-	-	-	-	-	-	-	93	0.3
3p	12	0.3	82	0.7	-	-	-	-	-	-	23	1.3	7	2.3	40	2.0	19	0.2	145	0.5
Sub-total	30	0.7	138	1.2	1906	50.5	9911	64.9	461	91.5	1599	88.9	7	2.3	40	2.0	2404	26.2	11688	38.3
4f	-	-	-	-	-	-	218	1.4	-	-	-	-	-	-	-	-	-	-	218	0.7
4fm	-	-	-	-	12	0.3	498	3.3	31	6.1	81	4.5	-	-	-	-	43	0.5	579	1.9
Sub-total	-	-	-	-	12	0.3	716	4.7	31	6.1	81	4.5	-	-	-	-	43	0.5	797	2.6
5w	-	-	-	-	-	-	-	-	-	-	-	-	293	94.2	1807	92.1	293	3.2	1807	5.9
Organic	25	0.5	37	0.3	1595	42.3	3950	25.9	-	-	44	2.4	-	-	25	1.3	1620	17.7	4056	13.3
Water	-	-	-	-	262	6.9	262	1.7	-	-	-	-	-	-	-	-	262	2.8	262	0.8
Total	4573	100.0	11488	100.0	3775	100.0	15276	100.0	504	100.0	1800	100.0	311	100.0	1962	100.0	9163	100.0	30526	100.0

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[1] Acreages for complex capability units have been calculated on a percentage basis and included within the sub-class categories.

TABLE 5.3: South Nation River Basin
Flood Zone Assessment
Agricultural Land Use Systems

Land Capability	Chesterville-Brinston Flood Zone				Plantagenet Flood Zone				Bear Brook Flood Zone				Vernon Flood Zone				Total 1:1.1		Total 1:100	
	1:1.1 acres	%	1:100 acres	%	1:1.1 acres	%	1:100 acres	%	1.1 :res	%	1:100 acres		1:1.1 acres	%	1:100 acres	%	acres	%	acres	%
P	12	0.3	212	1.8	654	17.3	1184	7.8	37	7.3	87	4.8	25	8.0	243	12.4	728	8.0	1726	5.6
C	885	19.3	2448	213	162	4.3	997	6.5	199	39.5	536	29.8	25	8.0	536	27.4	1271	13.9	4517	14.8
M	1009	22.1	2985	26.0	405	10.7	3825	25.0	-	-	355	19.7	56	18.0	393	20.0	1470	16.0	7558	24.8
H	1907	41.7	4685	41.8	1321	35.0	5576	36.5	50	10.0	299	16.6	87	28.0	498	25.4	3365	36.7	11058	36.2
HG	-	-	-	-	723	19.2	1857	12.2	112	22.2	206	11.4	56	18.0	87	4.4	891	9.7	2150	7.0
G	-	-	-	-	-	-	-	-	-	-	19	1.1	-	-	-	-	-	-	19	0.1
Sub-total	3813	83.4	10330	89.9	3265	86.5	13439	88.0	898	79.0	1502	83.4	249	80.0	1757	89.6	7725	84.3	27028	88.5
A_1	118	2.6	168	1.5	50	1.3	336	2.2	31	6.1	50	2.8	-	-	-	-	199	2.2	554	1.8
A_2	293	6.4	461	4.0	62	1.6	318	2.1	-	-	-	-	-	-	-	-	355	3.8	779	2.6
Z	256	5.6	380	3.3	136	3.6	841	5.5	75	14.9	224	12.4	62	20.0	193	9.8	529	5.8	1638	5.4
Zp	93	2.0	93	0.8	-	-	12	0.1	-	-	-	-	-	-	-	-	93	1.0	105	0.3
Zr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B	-	-	56	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56	0.2
X	-	-	-	-	-	-	62	0.4	-	-	-	-	-	-	12	0.6	-	-	74	0.2
E_1	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	6	-
E_2	-	-	-	-	-	-	-	-	-	-	12	0.7	-	-	-	-	-	-	12	0.1
T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	12	0.7	-	-	-	-	-	-	12	0.1
K	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
W	-	-	-	-	262	7.0	262	1.7	-	-	-	-	-	-	-	-	262	2.9	262	0.8
Sub-total	760	16.6	1158	10.1	510	13.5	1837	12.0	106	21.0	298	16.6	62	20.0	205	10.4	1438	15.7	3498	11.5
TOTAL	4573	100.0	11488	100.0	3775	100.0	15276	100.0	504	100.0	1800	100.0	311	100.0	1962	100.0	9163	100.0	30526	100.0

with intensive land use practices and clean cultivation are appreciably higher on a percentage basis in the Bear Brook flood zone.

More significant in terms of potential flood damage to crops is the acreage of the different land use systems, and particularly the monoculture and corn systems that are affected by the 1:1.1 year flood. It is the lands within the 1:1.1 year flood stage that are the most prone to the hazards of the late spring and fall floods.

A review of the flow data in the Delcan Study for May/June and July/October, indicates that in the Brinston and Plantagenet flood zone, the frequency that the May/June flow would exceed the 1:1.1 flood stage is 1 year in 20. For the Bear Brook and Vernon flood zones the May/June flow would exceed the 1:1.1 flood stage 1 in 50 years. The July/October flow data for the Brinston area was not sufficiently long term to calculate the frequencies; however, it is believed the frequencies would be similar in pattern to the Plantagenet area. The data for July/October flows for the three flood zones indicates that the frequency when the flows would exceed the 1:1.1 flood stage limit is 1 in 50 years.

It was not possible to determine the actual extent of the spring-summer floods. Based on field information, the impact of spring/summer floods is localized and confined mainly to the Brinston flood zone and the Cobbs Lake Creek section of the Plantagenet flood zone. They occur about one year in five. Within these zones they appear to be confined to low lying sections of fields where it is difficult to effect adequate surface drainage.

An analysis and correlation with the tile drainage study indicates that extensive areas within the Brinston flood zone are tile drained, while only a few tile drainage systems occur in the Plantagenet flood zone. Both the Bear Brook and Vernon flood zone have extensive areas of tile drainage. In the Vernon flood zone they are mainly in the upper section.

Based on the topographic maps and an assessment of the aerial photographs, the number of farm buildings within the flood zone that might be affected were counted. Within the Plantagenet flood zone there are 25 farmsteads which lie within the 1:100 year flood line. There are about 20 farmsteads in the Brinston-Chesterville flood zone. Within the Bear Brook and Vernon flood zones, only two sets of farmsteads were identified.

In the Plantagenet and Brinston area, dairying appears to be the dominant use. It was noted from the field survey that in both zones several barns were abandoned and that the farms were part of other farm enterprises.

The extent of the spring flood is variable and is dependent on a number of factors primarily related to climatic conditions, the amount of snow, the thawing and melting characteristics that have occurred, the amount of ice in the river and the occurrence of spring rains, etc. While the spring floods do impact on agricultural operations, they have, in general, little impact on crops, other than on a very local scale where depositions from flood waters may bury perennial crops, or where river banks and land may be eroded away. Any depositional aspects from floods were viewed as beneficial in terms of adding nutrients. Although many of the farmers within the flood zone perceive the spring flood as a normal annual event that precedes the planting season, a few others are more directly affected in terms of an interruption in the farming operations. Depending on the seriousness of the flood and the depth of water, entry into the farm area is often impeded and milk cannot be shipped out. In the past, this was not as much a problem when milk was shipped in cans and could be transported in boats. However, with the present day methods of bulk handling of milk, the problem becomes considerably more critical, and special permits must be obtained for emergency transport to neighbouring bulk tanks.

While this problem is real to a few farmers, efforts are being made to raise roads in critical areas in order to ensure access. The biggest problem caused by the flood is the damage to fencing which varies depending on the degree of the flood and the amount of ice. The other is the amount of debris left in fence rows and on fields which must be cleaned up before spring operations can begin.

Indications are that most of the buildings are above the flood level and there is no apparent concern with respect to structural problems. It appears that residents in the flood zone area have adjusted to the environment and view it as a discomfort and a nuisance. This is notwithstanding that most residents would like the flood problem ameliorated and brought under control.

With respect to the spring-summer flood, indications are that these are infrequent and often very localized and due to occurrences of climatic abnormalities which are often superimposed on high spring water levels. These floods have the greatest impact on crop production in that they come at a time when the crop is planted and in early growth period. If the flooding is of long duration, the crop is seriously affected. This summer flooding is more prevalent in the Brinston-Oak Valley area, and in the Cobbs Lake Creek area.

The fall flooding was not perceived to be a problem to agricultural production. There are, however, some problems in harvesting in the late fall, particularly in wet years when the fields become too wet and remain so over extended periods, thereby curtailing harvesting operations. It would appear that this problem is more prevalent on non-tiled fields.

Based on the field survey, the farmers interviewed believe that the proposed channel improvement up to Oak Valley will help to ameliorate the summer flood problem in the Brinston flood zone. Similarly, the proposed improvement to the Cobbs Lake Creek Channel in the Plantagenet flood zone will help to reduce the problem in that area.

5.2 Fertilizer Use

Comprehensive data on fertilizer use in the Basin is very limited. Census data on commercial fertilizer use on a county basis was abandoned after 1973. In Ontario, provincial data is maintained by the Fertilizer Institute of Ontario. Data from the Institute has been used to make projections of fertilizer use in the Basin.

In order to establish some historical base on which to develop projections, data from the 1971 census was taken and adjusted for the Basin. Table 5.4 summarizes the percentage of farms using fertilizer, the acres fertilized and the amount of fertilizer used in the Basin in 1971. At that time, approximately 42 percent of the farms in the Basin were utilizing fertilizer and applied it to roughly 93,000 acres. This acreage represents about 10 percent of the Basin area or about 29 percent of the cropped area in the Basin. A little over 16,000 tons, or an average of nearly 350 lbs per acre fertilized, were applied. The figures on commercial fertilizer use are suspect, particularly when expressed in terms of average application rates. The application rates for Russell and Glengarry Counties appear too high. These high figures influence the average obtained for the Basin. A value of 250 lbs. of fertilizer would appear to be a more realistic approximation.

An analysis of the crops fertilized is shown in Table 5.5. The data have been adjusted from the county figures to the Basin and show that in 1971 roughly 42 percent of the land fertilized was applied to corn, 22 percent to cereals, mainly oats, and 35 percent to hay and improved pasture.

Based on data supplied by the Fertilizer Institute of Ontario, it appears that, since 1973 and up to and including 1979, fertilizer use had increased by 30 percent, but that in 1980 there was a decline of 5 percent due to several economic factors. These factors include high interest rates, an increase in fertilizer price, general

TABLE 5.4

South Nation River Basin

Summary of Percentage Farms using Commercial Fertilizer, Acres Fertilized, Tons used in Counties that lie within the South Nation River Basin
(Acreage and Tonnage Figures Adjusted to Basin Area)

County	Percent of Farms Using Fertilizer	Acres Fertilized	Tons of Commercial Fert. Used	Rate of Application lbs/Acre
Ottawa-Carleton	39.7	11,588	1,498	258.5
Russell	50.7	23,906	6,073	508.0
Prescott	42.4	15,975	2,955	369.9
Grenville	51.2	9,250	1,377	297.7
Dundas	38.1	20,653	2,459	238.1
Stormont	36.8	9,070	1,220	269.0
Glengarry	38.5	2,340	520	444.4
Total for Basin	41.8	92,782	16,102	347.0

(SOURCE: Census Canada, 1971)

TABLE 5.5

South Nation River Basin

Summary of Crop Acreages Fertilized in the Basin
(1971 Acreage Figures Adjusted to Basin Area)

Crop	Acres Fertilized	Percent
Wheat	411	.5
Oats	16,470	18.5
Barley	2,546	2.7
Corn Grain	18,821	21.3
Other*	18,541	20.9
Hay	21,200	23.9
Improved Pasture	10,026	11.3
Special Crops**	922	.9
Total	88,937	100.0

*Mainly fodder corn

**Special crops include potatoes, treefruits, small fruits and vegetables

(SOURCE: Census Canada, 1971)

farm conditions, and the general outlook that prevailed. In Eastern Ontario, this decline was even more pronounced. Current data suggest that this was about 12 percent.

Utilizing the percentage data from above, estimates of current fertilizer use in the counties and in the Basin were developed, These are shown in Table 5.6. Utilizing similar application levels as in 1971, the 18,418 ton estimate for the Basin would fertilize approximately 121,000 acres. Assuming a more conservative and realistic application estimate of 250 lbs. per acre, approximately 147,300 acres would have been fertilized. This represents about 15 percent of the Basin or roughly 42 percent of the cropped land in the Basin.

While recent data concerning the acreage of crops fertilized are not available, it is believed that most of the fertilizer used is being applied to corn. Soil test data from the Ontario Ministry of Agriculture and Food laboratory in the Department of Land Resources, University of Guelph indicates that the majority of tests being done, and the requests for fertilizer recommendations, are for corn.

A review of the computer output data of soil samples tested from the counties in the Basin was made and selected data were abstracted and compiled. These data express the general status of the nutrient levels in the Basin and shows the average values of phosphorus, potassium, magnesium and the average pH of 3,766 samples that were tested for the period July 1, 1979 to June 30, 1980. No tests were done for nitrogen.

Table 5.7 summarizes these data for each of the counties. The data presented indicate that the level of phosphorus in the soil is, on the average, at a medium value and that inputs of phosphorus are required for most crops to produce their highest economic yield. Value for phosphorus levels between 0 - 9 are considered low, values of 10 - 20 medium, and 21 - 30 high. The data indicate that the level of potassium in the soils ranges from medium to high for the various counties in the Basin. Values of 0 - 60 are considered low, values of

TABLE 5.6

South Nation River Basin

Estimate of Fertilizer Use for the County Area that lies in the South Nation River Basin for the years 1973, 1979 and 1980

Counties	1971 Tons	1979 Tons	1980 Tons
Ottawa-Carleton	1,498	1,947	1,713
Russell	6,073	7,894	6,946
Prescott	2,955	3,841	3,380
Grenville	1,377	1,790	1,575
Dundas	2,459	3,197	2,813
Stormont	1,220	1,586	1,396
Glengarry	520	676	595
Totals	16,102	20,931	18,418

TABLE 5.7

South Nation River Basin

Summary of Data on Phosphorus, Potassium, Magnesium
pH Derived from Soil Test Data
July 1, 1979 to June 30, 1980

County	Number of Samples Tested	Average Phosphate	Average Potassium	Average Magnesium	Average pH
Carleton	908	13	123	188	6.7
Dundas	637	13	115	191	6.9
Glengarry	602	13	118	176	6.6
Grenville	232	13	74	185	7.0
Prescott	696	16	168	174	6.1
Russell	351	12	107	170	6.2
Stormont	340	14	96	144	6.9
Total Number of Samples	3,766				

61 - 120 are medium, 121 - 150 are high, 151 - 250 very high, and 250 excessive. The samples from Prescott County gave high readings, with over 65 percent of the samples tested resulting in readings or values above 121 ppm of K. At medium potassium levels, most crops would require inputs of potash (K20) to attain their highest economic yield.

The pH of soils tested also varied between counties and ranged from 6.1 to 7.0. In general, pH levels are such that liming is not required.

Applications of nitrogen are based on the expected yield of the crop to be grown. These are adjusted downward if manure is applied, or the previous crop contained perennial legumes. Recommendations for rate of application are detailed in publication 296, Field Crop Recommendations for 1980 issued by the Ontario Ministry of Agriculture and Food.

Within the Basin area nitrogen (N) is applied in several forms such as urea, anhydrous ammonia, ammonium nitrate and liquid nitrogen. Preference depends on the user, the equipment available, the cost per lb. or kilogram, and the cost of application. Phosphate (P_205) is supplied through superphosphate and monoammonium or diammonium phosphate. Potash (K20) is mainly supplied through muriate of potash.

In order to sustain crop production at levels now realized, commercial fertilizers are required. Without them there will be a depletion of the nutrient reserve and a decline to lower yield levels. With intensified agriculture, such as the introduction of tile drainage, changes in cropping patterns are anticipated. Increases in cropped acreage are also expected and fertilizer uses will increase. The Fertilizer Institute of Ontario predicts an annual increment of 4 percent in fertilizer use. The rate and level of increase will utlimately depend on the cost of fertilizers and the economic return. Use of cattle and other livestock manure and the ploughing down of green manure crops will also be an important source of nitrogen and other nutrients. Livestock is an important element in the Basin. Based on Census livestock estimates for 1976 and the production of 150 lbs or 68 kg nitrogen a year from each animal unit, it is estimated that nearly 8,000 tons of nitrogen are produced in the Basin each year through livestock. This source of organic nitrogen is not only important as a source of nutrients but also as a soil conditioner.

There can be no doubt that, with agronomic research and the introduction of new technologies, users will become more efficient and more refined in their use and application of both commercial and organic fertilizers in order to improve crop production and maximize their returns.

5.3 Soil Erosion Problems and Agricultural Practices

Soil erosion from agriculturally used land is not perceived to be a major problem in the Basin. The 1948 Planning and Development Report on the Basin identified only 40,000 acres or 4 percent of the Basin that had conditions which were susceptible to erosion. These constituted the sloping lands associated with the till plains and drumlin features in the Basin. The major part of the Basin is flat lying and extensive soil erosion, particularly of the gully and rill type, does not occur - other than in close association with the existing drainageways and river channels. There is some erosion of the clay soils through the dispersement of the clay particles and colloids that may be significant to agriculture.

The main impact of erosion is identified with the river channel itself, the activities which occur in and along the river valley and channel and the effects of the annual flooding. The degradation and aggradation of the river is an ongoing process; banks are cut, channels filled, flow and grades change.

Subsequent drainage systems have cut gullies into the valley flanks, particularly in the lower section of the Basin. Man-made changes have also been effective in straightening and widening channels, changing grades and stabilizing banks. Erosion is often associated with these activities until the disturbed areas become stabilized. One major physical impact to erosion was the large landslide in 1971 in the area below Casselman. This had an impact on flooding. Erosion from agricultural lands is subtle and not markedly evident.

Concerns have been expressed about the changes in agricultural land uses and the impact this has on soil erosion. A review of land use data, Census material, aerial photographs and reports indicates that the overall land use pattern in the Basin is changing. Agricultural land use patterns will continue to change, both in terms of the amount of land being utilized by agriculture and the manner in which agricultural lands are actually utilized.

The land area in agriculture has declined from the 1948 estimate of 650,000 acres, to a present-day estimate of approximately 580,000 acres. During that period, forestry land has increased slightly. The major increase in use or non-use is the amount of land that is currently identified as idle. This is nearly twice the acreage that was estimated in 1948. At that time, some 46,000 acres were idle. These changes in land utilization, while significant in the overall land use pattern of the Basin, are insignificant in terms of their impact on the reduction of erosion.

The changes in the actual agricultural use of land and the management practices being followed are more significant in terms of erosional impact. A substantial increase in the acreage under crop occurred between 1961 and 1971 in the Basin area. The acreage under crop increased by over 30,000 acres or 6 percent during this period. In a comparative analysis with the recent land use systems mapping that was done in 1979-80, the increase in crop acres appears to be continuing. This increase is paralleled by a marked decline in the acreage of improved pasture.

The cropping pattern also changed appreciably with a dramatic decline in the acreage of oats and an increase in the acreage of corn. While both these crops require the preparation of a seed bed for planting, the oats receive no further cultivation during the growing period. Corn, on the other hand, occasionally receives additional cultivation for control of weeds, with the result that during the early stages of growth, it is more susceptible to erosional forces.

Recent studies on water pollution from land use activities have identified the importance of the soil particle size in the loadings from agricultural lands. The implications are, that while soil material losses may be relatively small, nutrient losses could be significant because of the solubility of nutrients, their association with the clay colloids, and the ease with which the clays can be picked up and transported. In the Basin, this type of erosion may be the dominant type due to the extensive areas of clay soils and the extent to which some of these lands are flooded. There is little evidence in the Basin of any significant losses of soil from cultivated fields during the spring floods as the lands are often still frozen. The higher incidence of sheet/nutrient type of erosion is related to rainfall activities associated with storms and heavy downpours. With the trend to row crops, intensive cultivation practices and larger contiguous areas under clean cultivation, the problem of nutrient losses may be substantially increased. This condition is further aggravated by the effort towards remedial practices to ensure good surface drainage on the clay soil in order to avoid standing water on the crops.

Results on sheet erosion losses in Southern Ontario from selected watershed studies indicate that average soil erosion losses under continuous corn range from 1.3 to 5.4 tons/acre per year.

Utilizing the universal soil loss equation and taking into account the level lands of the Basin with continuous corn, similar losses are estimated. Agronomically, it is recognized that the practices of continuous corn is damaging and that rotations and other cultural practices must be followed. Zero cultivation with corn greatly reduces the erosion problem but also reduces the yield.

It appears that losses of materials and nutrients from fine-textured soils may be unavoidable regardless of the land use practice employed. However, it is believed that good agronomic and management practices can help to mitigate these losses. The agricultural erosional aspects in the Basin are not as readily apparent as in other parts of the province and need to be monitored and studied further.

With respect to the depositional aspects of the erosion cycle, certain benefits are perceived. Lands that receive a thin depositional covering of clay materials are having their nutrient condition enhanced. This is particularly true of the flood zone area in the Basin. Other areas, such as the drainage ditches are being affected by a buildup of materials and, therefore, must be cleared and maintained. It appears, however, that this situation problem maybe influenced more by the drainage improvements being carried out on the channels and by the in-filling from the channel slopes and spoil banks than from soil materials coming from the fields.

Concerns have also been expressed over the erosion of river banks at cattle crossings and watering points. Indications are that these are not extensive and would appear inconsequential to the total erosion pattern. Perhaps of concern is the question of livestock mucking and defecating in the water itself and the impact this has on water quality.

5.4 Irrigation in the Basin

Irrigation has not been an important element in the agricultural production system of the Basin. Census data for 1970 indicates about 3,770 acres were irrigated in the counties that make up the Basin. On a pro rata basis, it is estimated that there were about 1,800 acres being irrigated in the Basin in 1970. More recent statistical data on acreages is not available. However, it has been noted that irrigation is being utilized by speciality growers and some potato producers.

There are no large scale irrigation projects in the Basin. The need for irrigation is not a prerequisite to crop production; however, there are times when growers would find irrigation beneficial. In general, the rainfall patterns during the growing season provide adequate moisture to produce a crop. The mean annual moisture deficiency is less than 2 inches over much of the Basin. Nevertheless, there are areas and soils which would benefit from supplemental irrigation, both to bring crops through a period of drought as well as in some instances for frost protection.

Within the Basin there are over 3,700 acres of Class 2 land which has a moisture limitation and would benefit from irrigation. It is estimated that about 3,200 acres of these lands are currently being used in agricultural production. These lands are located in the upper part of the Basin in Edwardsburg, Augusta and Mountain Townships, and in South Plantagenet Township. There are nearly 73,800 acres of Class 4 land with moisture deficiency limitations. These lands comprise part of the extensive sand plain which extends through Gloucester, Cumberland, Clarence and North and South Plantagenet Townships. It is estimated that about 50 percent of these lands are being used for agricultural production.

The most critical factor in terms of irrigation is an adequate water supply during the dry period. The normal flows on the tributary streams during the summer period are very low with some parts having no flow. Any large scale irrigation from the river would have to be based on the storage of water. The alternative is groundwater sources; however, general indications are that while supplies are adequate for domestic uses, they are not for major municipal and industrial uses, and, therefore, would also be limiting for irrigation. An adequate supply for supplemental small scale irrigation might be found from point well sources in the sand plain or through storage in farm ponds.

In order to take water in excess of 10,000 gallons, (50,000 litres) per day from any source, a permit is required which is issued by the Ministry of the Environment. The permit to take water is required for on stream or off stream ponds and wells, but is not needed if the direct taking is for domestic and livestock watering purposes.

5.5 Outlet Drains and Tile Drains

Land drainage is very important to the future agricultural production in the Basin. An inventory of tile drainage in the Basin, detailed in Section 5.4 above, indicates that approximately 78,000 acres have already been tile drained. Current trends also indicate that about 10,000 acres are being tiled each year. The benefits of tile drainage are well documented in terms of the removal of soil water and improved aeration, resulting in an increased productivity of the soils, as well as allowing a flexibility in cropping patterns and assisting in the early cultivation of the land. The tile drainage study estimated there were approximately 273,500 acres in the Basin which are currently under agricultural use that would benefit from tile drainage. Whether all of these lands can be tile drained effectively is dependent on the provision of outlet drains. The main drainage system of the river, the improved municipal drains and ditches are necessary for the adequate removal of surface water from the agricultural lands, as well as the outlet for tile drainage systems.

The improvement of the municipal ditches and drains, and the removal of surface water from the land, has a marked impact on the flow characteristics, particularly during the spring runoff and during heavy storms and rainfalls. Water from the tile drainage has a lesser impact, in that most of the soils that are presently tile drained, and those that would benefit from drainage, comprise the lacustrine and marine clay soils in the Basin and are very slowly permeable. Water does not pass through these soils readily, with the result that tiles do not aid appreciably in storm water removal. After a period of tile drainage, soil structure is often improved through aeration of the soil and the development of a better rooting zone that increases permeability and hence infiltration rates are improved. Recent monitoring of the drainage systems in the Basin indicate that there is very little or virtually no flow during the summer period.

The installation of tile drains increases the productivity capacity of the land. Indications are that Class 2 and 3 lands that are tile drained now have production capacities equal to Class 1 land. Similarly, Class 4 and 5 lands that would benefit from tile drainage are elevated to at least the capability of Class 2 lands, and may even attain outputs of Class 1.

The issue of draining organic soils is a sensitive one in view of the fact that the organic soils in the Basin occur extensively in the periferal area of the watershed and are the source area for surface water. Other organic soil areas occur within the Basin but again, normally on the divide between subbasin systems. They are important in the hydrological regime of the Basin. While they are not without agricultural potential, their development impacts more directly on the hydrologic regime because they require a high degree of both surface and subsurface water removal and control. According to the Canada Land Inventory data, there are over 91,000 acres of organic soils in the Basin, of which 27,000 acres are estimated to be under agricultural use.

Further, drainage of the organic soils should be viewed more critically, particularly the larger bog areas, because of their importance as water reservoir and source areas for summer flows. Consideration might be given to the regulation of the hydrologic regime in the bog area through control structures to retain spring runoff.

5.6 Impact of Environmental Changes in Agriculture:

The use of insecticides, fungicides and herbicides are important in the control of insects, diseases and weeds which plague livestock and horticultural and agricultural crops. They are an essential and integral part of pest management needed to insure a sustained and improved agricultural production system. There are some 500 pesticides registered in use in Canada, the majority of which are synthetic, the others of natural origin. Hard data on the acreages which are sprayed with insecticides and herbicides is difficult to come by. The Canada Census no longer reports data on acreages sprayed. Data for 1971 adjusted to the Basin area shows that approximately 9,500 acres on census farms were sprayed with insecticides and 76,900 acres were sprayed with herbicides. This data is shown in Table 5.8.

The Ministry of Agriculture and Food, Economics Branch, carried out a survey of Pesticide Use in Ontario in 1973 and again in 1978. The results of these surveys were derived from questionnaires mailed to farmers, and data collected from County Weed Inspectors. The reports dealt with the aspects of pesticide use for field crops, fruit and vegetables and roadside spraying.

Table 5.9 provides a summary of the quantities of active ingredients of each type of pesticide used on all field crops, fruits, vegetables and roadsides in the Basin in 1973. These figures have been derived from data assembled on a county basis and prorated for the Basin.

Table 5.10 provides a summary similar to Table 5.9 for pesticides used in the Basin in 1978.

Herbicides increased markedly over the five-year period, nearly doubling, while insecticides and fungicides increased by 54 percent.

Recent indications from the chemical companies are that the amount of insecticides sprayed has remained about the same, while the amount of herbicides has increased.

Table 5.8

Acreages Sprayed with Insecticides and Herbicides in 1971

(Figures adjusted to Basin Area)

County	Estimated Area in Basin Sprayed for Insect and Disease Control Acres	Estimated Area in Basin Sprayed for Weed and Brush Control Acres
Ottawa/ Carleton	1,794	9,304
Dundas	2,554	24,354
Glengarry	275	2,064
Grenville	763	7,047
Prescott	1,448	10,333
Russell	1,645	14,828
Stormont	1,049	8,910
Totals	9,528	76,840

(Source: Canada Census 1971, Catalogue 96-731 (AA-14))

County Acreage Figures adjusted to Basin area on percentage basis.

Table 5.9

Estimated Quantities* of Pesticides used on Field Crops, Fruits, Vegetables and Roadside in the Basin in 1973

County	Herbicides Triazine	Phenoxy	Other	Total	Insecticides	Fungicides	Total
			Kilograms				
Carleton	5,555	2,072	5,180	12,807	849	288	1,127
Dundas	9,874	2,600	4,690	17,164	678	1,934	2,612
Glengarry	1,641	96	792	2,529	11		11
Grenville	5,315	2,030	1,901	9,246	235		235
Prescott	4,518	2,098	4,725	11,341	214	309	523
Russell	13,312	1,506	972	14,790			
Stormont	4,407	702	911	6,020			
Totals	44,622	11,104	19,171	74,897	1,987	2,531	4,518

*Quantities for Counties prorated to Basin on a percentage basis

(SOURCE: OMAF Pesticide Survey, 1973)

Table 5.10

Estimated Quantities of Pesticides used on Field Crops, Fruits, Vegetables and Roadside in the Basin in 1978

County	Herbicides Triazine	Phenoxy	Other	Total	Insecticides	Fungicides	Total
			Kilograms				
Carleton	9,604	2,100	12,272	23,976	452	799	1,251
Dundas	18,235	2,461	8,945	29,641	798	1,261	2,059
Glengarry	2,444	427	1,621	4,492	18	28	46
Grenville	4,844	969	2,061	7,874	264	430	694
Prescott	8,665	30	7,426	16,121	729	1,102	1,831
Russell	17,853	1,542	10,677	30,072	272	314	586
Stormont	12,383	1,568	23,390	37,341	216	285	501
Totals	74,028	9,097	66,392	149,517	2,749	4,219	6,968

(SOURCE: OMAF, Pesticide Survey, 1978)

Environmental awareness and reaction will continue, as will research and development into new products, and in the management and the study of alternative cultural practises. There is a re-evaluation of the more toxic elements and move away from these to less toxic pesticides.

There can be no doubt that pesticides will have a continuing and major role in ensuring a high and sustaining level of productivity. However, the increasing costs, the cost benefit ratio of alternative practices, and the social awareness of the environmental concerns will temper the use of some pesticides.

In terms of the environmental elements associated with wildlife and agriculture, the Ministry of Natural Resources, in their background information report on the Cornwall District land use strategy, have identified significant wildlife habitat areas for deer, moose waterfowl and small game.

They have also identified "sensitive" areas such as the Alfred and Moose Creek bogs and karstic features near Casselman. Their report indicates that the Hungarian partridge population in the Basin is now stable. It was apparently affected by the reduction in the hay pasture area. Rabies in foxes is reported on the increase and causing some concern. However, other than reporting on estimated population of wild life species and discussing land use impacts and population pressures, there is very little data of their impact on the agricultural sector in terms of crop damages and losses.

Some wildlife species are viewed as a detriment to agricultural production. Large flocks of birds can affect crop production through the consumption of seeds that are being planted. A similar problem occurs prior to harvest when the grain crops are ripening.

While hard data on these losses are not readily available, some estimates have been attempted in research projects and special studies. Much of the reported data appears to be derived from opinions. There is no systematic recording of crop losses due to wildlife.

While crop losses are often associated with bird damages, birds also provide some benefits in terms of insect control.

Animals such as racoons, squirrels and deer can be a nuisance to crop production in terms of crop damages. Other animals such as beaver and muskrat can significantly damage drainage systems. Such damages are normally found on crop land adjacent to wilderness tracts and wooded stream areas. These problems appear to be confined to specific localities, such as Mountain Provincial Wildlife Area, Larose Forest Area and the perimeter of the Alfred Bog.

Pesticides for protecting the livestock industry have contributed to better animal health and increased milk and meat production. In fruit and vegetable production, fungicides and insecticides are required to produce marketable crops. Herbicides play an integral part in crop production; they reduce annual crop losses caused by weeds, reduce cultivation and, therefore, reduce erosion and nutrient losses.

While pesticides are essential to agricultural production, they are subject to environmental concerns due to their toxicity and residual effects, and their hazard to nontarget species. Awareness of these problems is important as well as the occupational hazards; however, with proper, careful and timely applications, much of the environmental hazards can be avoided. Great care must be taken to ensure that sprays applied to agricultural lands do not drift onto adjacent lands and water.

While environmental contamination due to pesticides has been loudly lamented, considerable reduction in contamination has been affected by biodegradable pesticides. In terms of pest control, the main problem will be the ability of pests to develop resistance to pesticides. Many approaches to chemical and non-chemical methods have been explored and continue to be explored. The best approach appears to be an integration of all pest control methods will not prevent crop losses and are needed to ensure the marketability of the crop.

5.7 Water Quantity and Quality Problems in Agriculture:

Background reports indicate that most of the water supply for farm homesteads and barns comes from drilled or dug wells. Time or budget did not permit a comprehensive review of well logs and water quality data or detailed survey of water supply. In general, water supply in the sand plains or recharge areas is adequate and of good quality. Water supplies in the clay plain areas of the Basin have seasonal constraints and water quality is lower due to high mineralization and often sulphorous conditions. Concern has been expressed that present drawdowns in the Winchester area may be mining the aquifer and that further demands may impact severely on the regional groundwater supply.

Surface water supplies are not extensively utilized by urban and rural users. Only Casselman and Plantagenent are reported to draw water from the river. Supplies are erratic, with summer flows dwindling in many sections of the Basin to virtually nothing. Quality is reported poor. A Ministry of Environment study identified high coliform counts, and a higher than acceptable level of phosphorus based on their surface water quality objectives. It is understood that the sampling was limited and the sources of pollution were not adequately defined. While preliminary evaluation indicates a large part of the phosphorus pollution is contributed fron non-point sources by the agricultural sector, it is doubtful that this comes from indiscriminate applictions of commercial ferilizers or from the erosion products from cultivated fields. The application of fertilizer on a basin basis are relatively low (approximately 72 lbs. per improved acre) and the slope characteristics of lands in the Basin, particularly the central and upper parts, are very low, so erosion losses from cultivated lands would be considerably less than identified by the model analysis for western Ontario. Soils test results for crop and fertilizer recommendation indicate that the soils of the Basin are medium to low in soluble phosphorus.

A possible point source from agriculture might well be seepage from livestock manure disposal areas. Particularly in view of the fact that, with mechanical cleaners, less bedding is being used to absorb the liquid component of the manure. A study should be initiated into the classification of manure handling and disposal systems, the contribution these might have in terms of pollutants from seepage, and a program to improve these. A further source is cattle watering points and crossings; however, it is thought that these would be a rather insignificant as a potential source of phosphorus.

Because of the low flows during the summer months, some increase in the ppm and bacteria counts could be due to other influences, such as evaporation. It has been estimated that there are approximately 375 miles of main and tributary streams in the Basin.

This comprises a considerable water area and evaporation surface, and with little of no recharge of water for dillution, elements can become concentrated.

The low flow period, and the drying up of some sections of the river, are of concern to livestock operators along the river who depend on the river as a source of water for livestock and the grazing of young cattle and steers on lands that have no other source of water. While the issue of maintenance of a low flow is important to agriculture in terms of the availability of water for livestock, as well as for supplemental irrigation, the main issue is the elimination of stagnant water, the dilution and maintenance of water quality.

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CHAPTER IV

COMMODITY PRODUCTION AND MARKETING SYSTEMS

Farmers in the South Nation River Basin produce a wide range of commodities for local markets, processing and export to other areas. While dairy farming is the major form of enterprise, field cash crops, other livestock enterprises, egg production and horticultural crops make important contributions to the strength of the agricultural economy. Together, these commodity production systems and their supporting services constitute an economic base that has considerable potential for future growth and development in Eastern Ontario.

As in any area of mixed agriculture, it is not possible to treat every combination of livestock and crop production that occurs on Basin farms. What we have done is to treat the different elements as systems or groups on the basis of common characteristics, such as markets.

Commodity production and marketing systems in the Basin are examined under five major headings. They are:

1. Dairy and Livestock System
2. Eggs and Poultry
3. Field Crops
4. Horticultural Crops
5. Other Crops

1. DAIRY AND LIVESTOCK SYSTEMS:

1.1 Introduction

The South Nation River Basin, as outlined in the Farm Structure section of the report, is primarily a livestock area. While not all, the overwhelming majority of farms keep some type of livestock. Of the 2,747 farms in the Basin area in 1976, no less than 89 percent reported cattle, 16 percent hogs, and 16 percent hens or chickens. The large majority (78 percent) of the farms with cattle kept one or more milk cows. The Basin is typical of Eastern Ontario in that almost all farmers keep some cattle and the largest number of these are for milk production.

The number of dairy farms in Eastern Ontario decreased by 33 percent from 1971 to 1976. While the data available does not allow an exact comparison, we believe it has decreased by approximately 25 percent from 1,827 to 1,341 in 1980. The majority of dairy farmers who switched to another type of farm enterprise are likely to have moved into beef production, as occurred from 1971 to 1976. The trends in dairy and beef are more completely discussed in the following sections.

While there are substantial numbers of dairy cattle in the Basin, the number of beef cattle, hogs, sheep and poultry are quite small compared to other parts of Ontario. The beef industry may be characterized as primarily oriented to cow-calf operations with a small number of feedlots. The trends in beef cattle numbers are very difficult to determine accurately because of changes in the way numbers of beef cows and heifers are reported by Statistics Canada and the Ontario Ministry of Agriculture and Food.

The hog industry in the Basin is relatively small but has grown substantially since 1976. Most of the hog farmers in the Basin produce weaner pigs, a high proportion of which are sold to Quebec. Since only limited information is available on the movement of weaners and feeder pigs to Quebec, the full scope of the hog industry in the Basin is very difficult to estimate.

Poultry production in the Basin is relatively unimportant. The absence of a poultry killing plant has discouraged the raising of chicken broilers and turkeys. Egg production in the Basin tends to be concentrated in the Plantagenet area. This specialized type of farming is primarily limited by the availability of production quota.

This section of the report presents an outline of marketing and slaughtering systems in Eastern Ontario as well as a description of the dairy, beef, hog, and poultry industries. For each of the livestock groups, an attempt has been made to present an overview of the production side of the industry as well as a brief description of the marketing system. The potential for growth in each commodity or industry is also presented.

1.2 Livestock Marketing and Meat Processing

The marketing of livestock in Eastern Ontario depends to a very large extent on local sales barns and drovers. A report on the community-auction markets was completed by the Ontario Ministry of Agriculture and Food in 1977. At that time, six sales barns were operating in the Basin or in adjoining counties. At the time of writing, four of the sales barns are still operating. The auctions at these sales barns represent the major market for cull dairy cows, bob calves, beef cows, beef feeders, cull sows, and weaner pigs. Finished hogs are sold through the Ontario Pork Producers Marketing Board yards at Kemptville, Finch and McCrimmon. A very few finished hogs are sold at sale barns for slaughter by local abattoirs and Quebec packers even though this is technically illegal.

As will be discussed in a following section, only a small proportion of livestock produced in the area are slaughtered locally.

Some animals sold locally are purchased by buyers or drovers who move them to Toronto or Montreal for slaughter. A substantial proportion of the fattened steers and heifers produced in the area are marketed in Toronto. Given the limited number of local buyers of high quality steers and heifers, most feeders prefer to ship them to Toronto where more buyers are present.

The production and processing of red meat in Eastern Ontario was studied by the Ontario Ministry of Agriculture and Food in 1977. The study included all counties east of Hastings and five Quebec counties. While the same general situation may apply, we are hesitant to project the findings to the Basin.

Eastern Ontario is a deficit meat production area no matter how it is defined geographically. The total demand for beef in the Ottawa-Hull area was estimated to be 148.9 million pounds in 1976. Total beef slaughter in the areas provincially and federally inspected plants was about 46.3 million pounds. There was a deficit of approximately 100 million pounds of which about 30 percent was supplied from the Toronto-Kitchener area and 65 percent from Western Canada. Boneless beef coming into the area from Australia and New Zealand represented about 5 percent of the total consumed. Very little meat is processed in the Ottawa-Hull consuming area.

The demand for veal in the Ottawa-Hull area was estimated to be 6.6 million pounds in 1976. Only one-eighth of this meat was slaughtered locally. At that time, only 6 percent of the estimated 71.6 million pounds of pork consumed in the area was slaughtered locally.

In 1979, the number of livestock slaughtered in provincially inspected plants in the entire Eastern Ontario region was as follows: cattle 13,251; calves, 2,357; hogs 38,566; and sheep and lambs 3,623. If these are converted to meat equivalents on the basis of 550 pounds for cattle, 150 pounds for calves, 165 pounds for hogs and 65 pounds for sheep and lambs, the total production was 14,240,485 pounds. Given a population of 1,026,000 in the Ottawa-Eastern Ontario area, this represents only 7.5 pounds of beef and 6.2 pounds of pork per capita. If this local market consumed the national average of 88.2 pounds of beef and 65.5 pounds of pork in 1979, then only 8.5 percent of beef and 9.5 percent of pork was slaughtered locally in provincially-inspected plants. The level of local slaughter has decreased since 1979 because of the closure of one of the Ottawa slaughter facilities.

There are 10 provincially-inspected slaughter houses in the Basin and an additional 9 in the adjoinging counties. The only federally-inspected plant in the area is located in Ottawa. Statistics are not readily available from that plant because of confidentiality considerations.

The number of animals slaughtered in the 19 provincially-inspected plants in or near the Basin in 1979 was as follows: cattle and calves 5,924; hogs 13,782; and sheep and lambs 1,414. It is apparent that the Basin and the surrounding area is quite deficient in both meat processing and livestock to feed the population of Eastern Ontario.

The 1977 Ontario Ministry of Agriculture and Food study characterized the local slaughtering plants as being of three types:

1. Plants with federal inspection that sell basically to the Ottawa-Hull customers. There is only one such plant at present, namely Crabtree Meat Packers Limited.

2. Plants with provincial inspection that have some penetration into the Ottawa-Hull market at the wholesale or retail level, or both.

3. Plants with provincial inspection that basically custom kill and operate in the freezer trade in local markets away from the Ottawa-Hull area. The majority of plants in the Basin are of this type.

The potential for expanded slaughtering appears to exist in the area but it is relatively limited. The numbers of livestock in the area are not adequate to support a major slaughter plant. Slaughter houses tend to be located near major sources of supply, substantial numbers of skilled labour and where they can best market by-products. Even if a major plant considered establishment in the Ottawa area, it has no guarantee of purchasing the high proportion of animals produced in the area. Farmers will always sell to the market which appears to maximize their returns.

The small slaughtering plants are located close to their supply and to their customers. They provide a service to local farmers who want meat for their own use and to residents who wish to purchase half or one-quarter of an animal for their freezer. The cost of such a plant is comparable to that of a commercial dairy farm and can provide an owner-operator with an attractive income.

1.3 Dairy

The production of milk is the single most important agricultural activity in the South Nation River Basin. In 1976, just under three-quarters of all farmers with sales of over $2500 received the major share of their income from the production of milk. Since that time the number of dairy farmers has decreased but dairying is still the most important farming activity in the study area.

In 1980, a total of 1,341 farmers in the Basin sold milk to the Ontario Milk Marketing Board. This compared to 1,912 farms which reported dairy cows in 1976 and 1,827 which had over 50 percent of their income from dairy sales. The reduction in dairy farms from 1976 to 1980 was approximately 23 percent in the Basin compared to a reduction of 26.6 percent for all Ontario. Note the actual percentages may differ slightly from those reported by other agencies because the definition of a dairy farmer used by the 1976 Census of Agriculture and by the Ontario

Milk Marketing Board may not be identical. The comparisons between the Basin and Southern Ontario are based on equivalent definitions. In 1980, 11.2 percent of all Ontario milk producers lived in the South Nation River Basin.

1.3.1 Production Characteristics

The 1,341 farmers residing in the Basin who were registered with the Ontario Milk Marketing Board in 1980 sold a total of 259,874,000 litres from November 1, 1979 to October 31, 1980. Average sales per farm were 193,800 litres which was higher than the Southern Ontario average of 184,600 litres per farm.

Only 27 percent of the milk sold went for Class 1 (Fluid) sales compared to 37 percent for Southern Ontario. This difference is important because Class 1 milk which goes into the fluid market receives a higher price than milk which goes for industrial purposes such as the production of butter, cheese or ice cream.

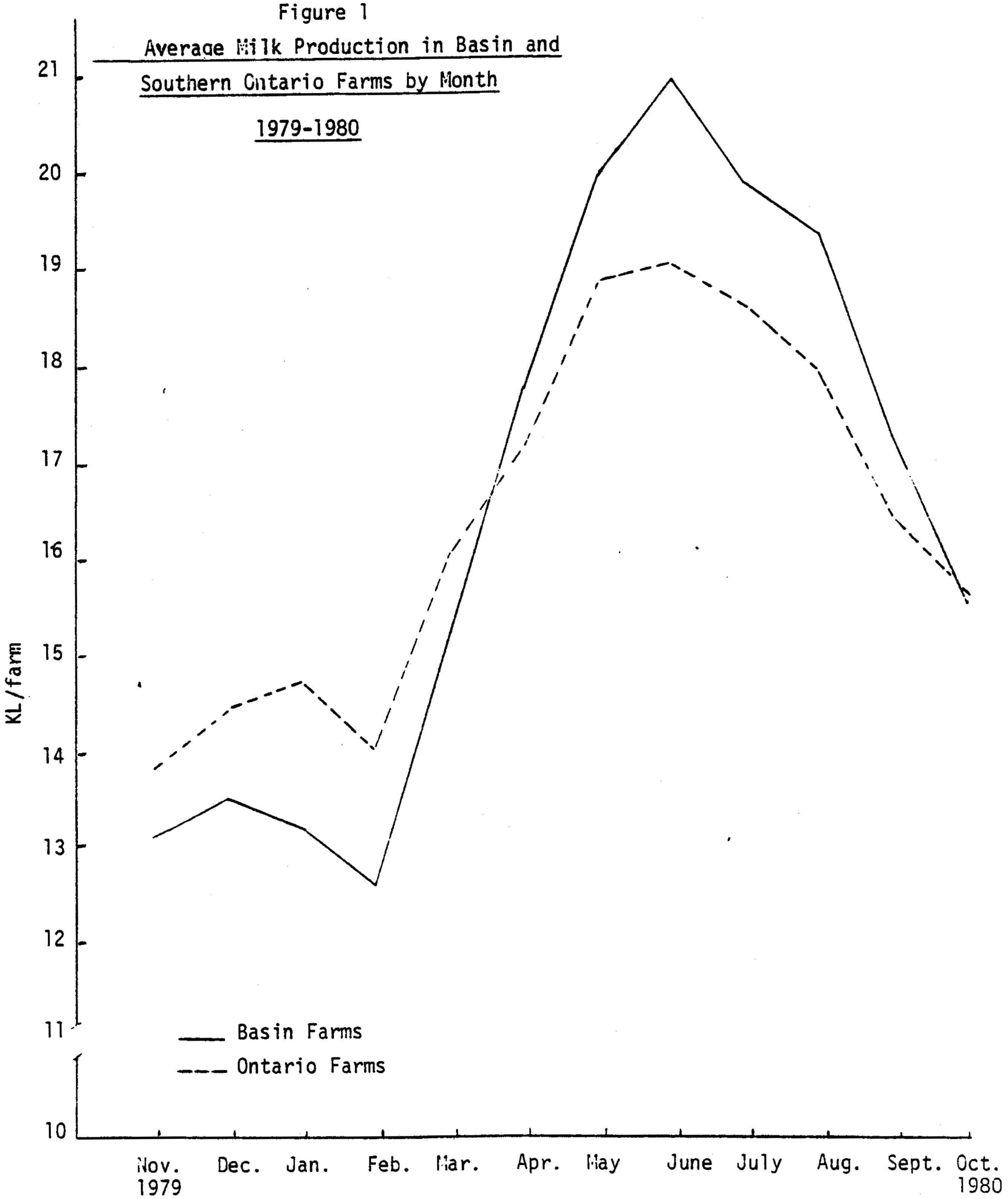
The average Group I Quota of Basin farmers was 218 litres per day compared to 280 litres for all Southern Ontario milk producers. The average Basin milk producer had 135,443 litres of Market Sharing Quota which is somewhat more than the Southern Ontario average of 109,111 litres per year.

The data provided by the Ontario Milk Marketing Board included monthly shipments for the period from November 1979 until October 1981. The average production per farm is shown by month for the South Nation River Basin and Southern Ontario in Figure 1. The graph indicates that there is considerably more seasonal variation among Basin than non-Basin farmers. This is a historical characteristic of Eastern Ontario. Traditionally milk producers in Eastern Ontario sold a substantial share of their milk to cheese factories. These factories were willing to accept a high proportion of milk during the spring and early summer, thus

Figure 1

Average Milk Production in Basin and Southern Ontario Farms by Month

1979-1980



creating a pattern of production which was extremely seasonal.

Seasonal variation in milk production has decreased over the past 15 years due to an increase in the proportion of milk being used for fluid purposes, graduated entry, bulk tanks, greater specialization, better management, and a decrease in the number of small herds. It is anticipated that seasonal variation in production will be further reduced as the distinction between Group I and Manufacturing milk is reduced. The two separate pools will likely be combined since producers will have the same quality and similar production maintenance standards, when the new sanitary standards are introduced in September, 1981.

The problem of seasonal variation in milk production is important in the sense that it reduces the overall efficiency of the dairy industry. Because of seasonal variation, processing plants are unable to operate during the fall and winter at their most efficient level. On the other hand, some farmers believe they can produce milk more efficiently on a seasonal rather than a constant basis. Seasonal producers tend to minimize their costs by maximizing their production during the period when relatively inexpensive pasture is available. Seasonal variation is strongly related to herd size with smaller herds tending to produce a greater proportion of their milk during the spring and summer than large herds.

1.3.2 Trends

During the past 10 year period, the number of dairy farms in Ontario has decreased quite significantly. The number of farms registered with the Ontario Milk Marketing Board decreased between 1970 and 1980. While we do not have figures for the Basin, we believe the numbers there have decreased sharply. The changes in the Ontario dairy farm sector have been intensively studied by Agriculture Canada, reporting the following changes from 1971 to 1976 for Eastern Ontario:

1. The total number of farms decreased only slightly from 15,400 to 14,340 but the number of dairy farms decreased from 8,195 to 5,495, a decrease of 33 percent.

2. Only 53 percent of the farmers who operated a dairy enterprise in 1971 still did so in 1976. A total of 905 entered dairy farming between 1971 and 1976. This represents 16 percent of those who had a dairy enterprise in 1976.

3. Relatively few, (235) non-dairy farmers shifted into dairy production over the five year study period. This compares to 1,675 farmers who shifted out of dairying to some other enterprise.

4. The farms which adjusted out of dairy farming to another enterprise moved into the following types of production: cattle 69 percent; small grains 11 percent; hogs 3 percent; and mixed livestock or other 17 percent.

5. The majority of dairy farmers who quit had relatively small herds. More of the Ontario farmers with small herds quit than remained in dairy production. This is probably also true in the Basin. The net effect is a concentration in milk production by a decreasing number of larger farm units.

There are unfortunately no studies of changes in the Ontario dairy industry from 1976 to the present. The number of dairy farmers has continued to decrease and this trend is anticipated to continue. The primary reasons for leaving dairy production are retirement, desire to reduce the amount and degree of labour commitment and alternate farm and non-farm opportunities. The major impediments to entering dairy production are: the large capital investment required and the high degree of commitment in the sense that one must milk cows twice a day every day of the year.

It is likely that few new dairy farm enterprises will be established in the foreseeable future. New entrants in the business will purchase existing operations instead. The number of dairy farms is expected to continue to decline in the next five years and the total number of cows milked may also decline slightly. The total amount of milk produced will probably remain constant or increase depending upon Ontario Milk Marketing Board and Canadian Dairy Commission policies.

1.3.3 Milk Production Systems

The majority of dairy farms in the Basin specialize in the production of milk. They tend to sell most bull calves at a few days of age and raise their own replacement heifers. Some farms keep a few beef cattle or raise steers and surplus heifers for dairy-beef. A limited number also have a sow enterprise but this usually requires separate buildings in order to meet health inspection standards.

Approximately half of the dairy farmers in the seven counties which include and surround the Basin have pipeline milkers. As may be seen in Table 1.1, 53.5 percent of all dairy farmers in the region have a pipeline milker, 38.3 percent use bucket milkers and 8.2 percent have a dumping station. The use of pipeline milkers is highest in Russell and lowest in Glengarry County.

The overwhelming majority of dairy farmers in the Basin employ the conventional tie housing system. Ninety-six percent of the farms use a conventional tie system while 3 percent have free stalls with a milking parlour. Other systems such as free stalls only, loose housing and conventional tie with a milking parlour were reported by only 11 farmers out of 2,259 surveyed by the Ontario Ministry of Agriculture and Food. The use of milking parlours was highest in the Ottawa-Carleton region but is still less than one in twelve farmers.

Most dairy farms produce all of the roughage and the majority of grains required to feed their milking herd and replacements. The

Table 1.1: Dairy Milking Equipment

County	Bucket Milker	Bucket Milker With Dumping Station Percent	Pipeline	Number
Dundas	34	6	60	416
Glengarry	55	7	38	291
Grenville	43	3	54	138
Ottawa/Carleton	30	10	60	441
Prescott	42	11	47	413
Russell	28	10	62	282
Stormont	44	7	49	263
Total Number	38	8	54	2244

major feed purchases are in the form of grains and protein supplements. The increase in corn production in the past 10 years has led to the purchase of conventional tower and oxygen-limiting silos. These silos have allowed farmers to become more self-sufficient in the production of both high energy feeds such as corn silage and high protein feeds such as alfalfa haylage. This trend toward increased self-sufficiency in forages, grains and protein is likely to continue. Other trends include an increase in zero or limited grazing, an increase in grain corn production on land formerly required to produce hay or pasture, and an increase in the production of soybeans as a cash crop and for limited on-farm use in dairy rations.

Basically, because of both increased drainage and improved crop handling system, the same amount of milk will, in the future, be produced on fewer acres. The number of dairy farms will decrease and the amount of land on the remaining dairy farms available for the production of cash crops will increase. It is quite probable that larger dairy farms will become less specialized as they develop complementary cash crop enterprises based on the sale of grain corn, barley, wheat and soybeans.

1.3.4 Milk Marketing

The marketing of all milk produced in Ontario is the exclusive responsibility of the Ontario Milk Marketing Board. No one else may purchase milk for fluid or processing purposes. The price received per hectolitre and the quantity a farmer may sell to the Ontario Milk Marketing Board are determined by the policies of the Canadian Dairy Commission and the Ontario Milk Marketing Board. The marketing of milk is closely regulated with the result that opportunities for an increase in total production are quite limited.

The institutional structure within which milk is produced in Ontario is quite complex and rather difficult to explain in simplistic terms. At the risk of over-simplification the major relevant characteristics of the system are as follows:

1. There are basically two types of milk in Ontario, fluid milk which is used for bottling and industrial milk which is used to produce butter, cheese, ice cream, yogurt, etc.

2. The total supply of milk to be produced in Canada is determined on an annual basis by the Canadian Dairy Commission, a federal agency. Each province has been assigned a percentage of the total market by means of Market Sharing Quota. Ontario presently holds 31.3 percent of the total MSQ. This quota which applies to the production of industrial milk has been distributed among the producers in each province. Market Sharing Quota gives a farmer the right to sell a fixed share of the total amount of industrial milk produced in Canada as well as guaranteeing a price for all the milk sold by the farmer up to the level of the quota.

3. Fluid milk production and sale is a provincial responsibility and in Ontario the Ontario Milk Marketing Board has issued Group I Quota to milk producers who met quality standards. Group I Quotas have minimum maintenance standards which in effect force farmers to produce milk on a continuous basis all year. While fluid milk producers do not come under the direct control of the Canadian Dairy Commission, they must hold adequate market share quota to cover approximately one-quarter of their fluid production plus any production in excess of their Group I Quota.

4. The price of milk to dairies is established by a cost of production formula developed by the Ontario Milk Marketing Board. The Ontario Milk Marketing Board prices and delivers milk to dairies and processors on the basis of the end use of the milk. The system rations milk so that products which are sold at a higher price have priority

over products which bring a lower price. Processors have plant supply quotas which allow them to share the supply of milk but do not guarantee an absolute amount of milk.

5. The Canadian Dairy Commission establishes a target price for milk on an annual basis based on a formula which includes the cost of production, the cost of living, etc. The Canadian Dairy Commission is able to achieve the target price by means of offers to purchase, subsidies and embargoes on non-Canadian dairy products. The offer to purchase system involves the Canadian Dairy Commission offering to purchase butter and skim milk powder at prices which allow the processors to pay farmers a given price for their milk. The difference between the price received for milk products and the target price is paid to the farmers in the form of a direct subsidy. The whole complex system is only possible because dairy product imports are strictly regulated at relatively low levels by the Canadian Dairy Commission.

6. The practical implications for Basin dairy farmers are that they can only increase their milk production to the extent of the Group I and Market Sharing Quota they hold. At the present time, both quotas may be freely traded among farmers in Ontario. For administrative purposes, Southern and Northern Ontario farmers are treated as separate pools or groups. The cost to a milk producer of purchasing additional Fluid Quota is approximately $90 per litre. A litre of Group I Quota allows a farmer to sell 1 litre of milk every <u>day</u>.

   Market Sharing Quota which is based on annual sales, recently sold at 33 cents per litre. Farmers in the South Nation River Basin may purchase either Group I or Market Sharing Quota at each monthly quota exchange. There are specific rules on the relative and total amounts of quota which may be held but in general terms, Basin farmers may freely compete with other Southern Ontario farmers for either quota. (See Appendix B for recent quota transfers)

1.3.5 Potential Growth of Dairy Farming

There are two areas of potential growth for Basin dairy farmers in terms of dairy production. These are to increase milk production or to increase income from the sale of calves. Dairy farmers may diversify into the production of cash crops or other livestock but these options will be considered in the crop section of this report.

The opportunities for increased milk production are determined not by land resources, managerial capability or markets, but by institutional systems. Given that the Ontario Milk Marketing Board is the sole purchaser of milk, they effectively control the production of milk in the Basin. In order to increase production, a dairy farmer must purchase additional quota. Therefore the cost of quota relative to potential profits from milk production is the determining factor in increasing milk production.

Given the fact that both Group I and Group II (MSQ) Quotas are freely traded in Ontario, the issue becomes one of comparative advantage among dairy farmers in various areas of Southern Ontario. It can be argued that dairy farmers in the Basin are free to expand their milk production to the extent they are able and willing to outbid other farmers for quota.

It is difficult to determine, in dollar terms, if Basin farmers have an absolute advantage over dairy farms in other parts of Ontario. While they may not have an absolute economic advantage, that is, they can produce milk at a lower price, they may have a comparative advantage. A comparative advantage implies that milk provides a higher net income relative to alternate crops in the Basin than milk production relative to other crops in the rest of Southern Ontario.

A theoretical discussion of absolute and comparative advantage is beyond the scope of this report but the basic difference between them is quite important. We believe that Eastern Ontario dairy farmers have a comparative advantage over Southwestern dairy farmers for several reasons including, land prices and the profitability of alternate enterprises. A further important non-economic factor is tradition.

The cost of producing milk in Eastern Ontario has been estimated by the Ontario Dairy Farm Accounting Project during 1977, 1978 and 1979. In each of the three years for both fluid and industrial milk producers, the farmers in Eastern Ontario reported expenses which were not significantly different than those in other parts of Ontario. These cost estimates did not include any charge for land other than interest actually paid. They do not provide an indication of the advantage Eastern Ontario farmers have over those in Southwestern Ontario.

One of the disturbing things indicated in the Ontario Dairy Farm Project was the amount of labour required to produce milk in Eastern Ontario. Both the direct labour used to produce milk and time spent in management and overhead were higher for fluid producers in Eastern Ontario than the rest of the province. For example, in 1977 the average number of hours per hundred weight of milk in the Eastern area was 1.29 hours compared to .88 hours or less in all other regions. The differences among industrial shippers were much smaller but still tended to be higher in the Eastern counties than the rest of the province with the exception of the counties directly west of the study area.

The implication is that at least among the sample of dairy farmers on the Ontario Dairy Farm Accounting Project, the general level of labour efficiency is lower in the counties which include the Basin than in most other areas of Ontario. This is true for both the time spent directly on milk production and spent on overhead and management of the dairy farm. This may be due to a smaller number of cows per farm or cows per man, less production per cow or a lower level of labour efficiency.

The results of the Ontario Dairy Farm Accounting Project panel do not provide an acceptable answer to the question of the ability of Basin farmers to compete for either fluid or Market Sharing Quota. Given the absence of hard data on which to predict future trends in the location of milk production, we hesitate to estimate the volume of milk which will be produced in the Basin in the future. The following developments are probable and will be encouraged by increased drainage in the Basin.

There is a long tradition of dairy production in the Basin and this will likely ensure continued milk production even in the face of profitable alternative farming activities. The attitudes and skills of most farmers in the Basin predispose them to maintain their dairy operations.

The production of milk has been and will probably continue to be less risky and more profitable than almost all other types of farming in the Basin. The major uncertainty as to the future profitability of milk production for those in the industry relates to the continued willingness of the Government of Canada to subsidize milk production. Given present political realities, it is unlikely that milk production will be allowed to become unprofitable. Therefore the majority of dairy farmers have a high degree of security.

There appears to be an opportunity for milk production to increase in the Basin and the surrounding area relative to the rest of Ontario. This is possible if Basin farmers improve their level of efficiency in terms of production per cow, production per man, acres required to feed a cow and reduce the degree of seasonal variation in milk production. Such changes are consistent with present trends which will produce a restructuring of the dairy industry. The relatively small and highly seasonal farms will disappear because the owners will find it more attractive to sell their quotas than continue production. A number of producers will likely quit in the short term since the Ontario Milk Marketing Board has established a September 1981 deadline in regard to sanitary standards for all milking facilities (an initial estimate is 7%).

Seasonal variation in production is greater in Eastern Ontario than the rest of the Province. This appears to be related to historic patterns of production based primarily on sale of milk to cheese factories. The small local cheese factories operated only during the spring and summer, preferred grass milk and were not geared to year round production. These plants are extinct and have been replaced by multiproduct plants which want a regular flow of milk to maximize efficient production. Some farmers have not yet fully adjusted to the changed market.

The degree of seasonal variation in milk production is reduced as the percentage of fluid milk produced increases. We anticipate the relatively low proportion of milk being sold for fluid purposes will increase over time. Once all buildings have attained fluid standards, the only inhibitions on increased purchases of fluid quota will be the cost and the ability to meet regular delivery criteria. While quota cost will continue to be an impediment, those Basin farmers who wish to increase their incomes will purchase additional fluid quota. At the present time, fluid or Group I Quota is selling at approximately $90 per litre. While this price is high in historical terms, the Ontario Milk Marketing Board claims that a producer presently producing adequate industrial milk to supply an increase in fluid quota can recover the cost of the fluid quota in approximately one year due to price differences.

In effect, the difference in price between the two markets is large enough to provide an increase in income greater than the cost in less than one year. Under these circumstances, one would anticipate Basin producers with low fluid quotas would purchase additional fluid quota before increasing their herd size or purchasing additional land. Given the relatively high degree of capitalization present amoung dairy farmers, it may be somewhat surprising that the price of fluid quota is not higher.

In a study conducted for the Ontario Milk Marketing Board on seasonal variation in milk production, it was apparent that the highly seasonal Eastern Ontario producers tended to remain seasonal because they believed they were minimizing costs. They tended to produce a high proportion of milk in the spring and early summer when their cows are on grass. Many of these farmers are likely to leave the industry during the next five years. Their quotas will be purchased by larger, more efficient dairy farmers who will produce milk on a less seasonal basis. One of the most obvious indicators of the trend away from a pasture-oriented production system is the rapid expansion of tower silo construction, which indicates a major commitment to intensive dairy production.

1.4 Beef Production

The production of beef has traditionally been of little significance in the Basin. Dairy farming historically was more profitable than beef production and few farmers kept beef cattle. It should be noted that dairy type calves and steers were used to produce meat but commercial production of meat using dairy breeds was not popular.

During the past 10 years, the number of beef herds and feed lots has increased slightly in both percentage and absolute terms. The numbers are small relative to dairy production. The number of beef cattle in the Basin is estimated to have been 13,000 in 1971 and 16,000 in 1976. The number of beef cows were approximately 16,550 in 1976 and 15,500 in 1980. Changes in census definitions and reporting procedures and the need to extrapolate from counties to the Basin make an exact count impossible. The inconsistency re: 1976 numbers of cows and cattle is probably due to the fact fewer beef cows were in the Basin area of some of the counties than in non-Basin area. Some beef cattle are produced on dairy farms and some dairy cattle are used to produce beef. Consequently exact estimates are very difficult.

1.4.1 Production Characteristics

Beef production can take many forms from the raising of breeding stock to cow-calf; to grassing stockers; to feed lots. The scale of operation can also vary from a few cows to a large number. Given this variation, it is unwise to make many generalization. We believe the majority of beef producers are: 1) part-time farmers who have a job in Ottawa or the area; or 2) former dairy farmers. The labour demands of a small cow-calf operation are such that a few cows can be easily kept by someone with a full-time job. This type of operation is attractive to ex-urbanites and others who wish to make some use of the land.

The study by Cumming indicated a tendency for exiting dairy farmers who are not retiring to go into beef production. Given the similarity of managerial skills, housing and machinery required, this type of adjustment is relatively inexpensive. The labour demands of beef production are substantially less than of dairy production, thus its attraction to older people.

There are a few feed lots in the Basin but we anticipate little growth until beef production becomes more profitable. Feeders have, in the past months, experienced negative margins.

1.4.2 Trends

We anticipate a small but steady increase in the number of beef farms in the Basin. The increase will be more the result of a push-out of dairy than the pull of large profits. As the number of dairy farms increase and consolidate, those who leave because of age or inability to expand to an efficient size, due to the price of quota, will move into beef production. It is easier and less costly to move into a cow-calf operation than a large cash crop or hog operation. Some farmers will switch to cash crop but others will prefer to keep livestock. Unless there is a marked upturn in calf prices, the movement into cow-calf will be relatively limited.

Feed lots may increase in number mainly as the result of a desire to market forages and/or excess grain production. The number of large feed lots is not expected to increase rapidly because of the high risk, large capital investment and recent low profit levels. A continuing study of beef feed lots being conducted by the Ontario Ministry of Agriculture and Food indicated an average net farm income as follows: 1973 $39,610; 1974 $21,753; 1975 $18,301; 1976 $4,766; 1977 $24,490; 1978 $84,240; and 1979 $37,188.

While these incomes are relatively attractive the contribution of the beef feed lot toward the net profit of the farm was much less. The returns were as follows: 1973 $13,269; 1974 -$9,730; 1975 -$5,656; 1976 -$11,972; 1977 $14,544; 1978 $69,742; and 1980 $8,821. These returns represent the return to labour, management and capital investment. The equity owned by the feed lot operators average over $200,000 in 1974 and over $500,000 in 1979. The profits earned by feed lots are very low in view of the large investments required.

We believe an opportunity exists in the Basin for increased grassing of weaned stockers and heifers. Such an operation involves purchasing calves in 500-600 pound range in the Spring, running them on pasture September to October and then selling them to feed lot operations for finishing.

The primary advantage of such an enterprise is that it requires a relatively small investment and utilizes pasture which can be grown on land of lower capability. Good quality steers will gain up to 1.5 pounds per day if a small amount of grain is fed during the latter part of the summer. Gains of 200 pounds over a six month period are quite achievable. At least one steer per acre can be carried on Class 1 land. A carrying capacity of 1.5 acres per animal, including hay which would be fed in the Spring and during September and October, is probable.

A budget for 100 steer calves is shown in Table 1.2. The figures used are relatively conservative but indicate a return to labour, management and land of $56.40 per animal. This return is not very high compared to some crops but is substantially more than much of the unused pasture land is now producing.

The prime requisites of such an operation are a water supply, excellent fences and proper pasture management. Grassing of weaned stockers would appear relatively attractive to a part-time farmer or a landowner living in the area who has a second job or income. It is also important to have access to relatively large lots of calves and a market for them in the Fall. Feeder sales such as those at Galetta provide such a market.

1.4.3 Constraints on Beef

The production of beef, meaning finished steers or heifers, in the Basin area is not greater for a number of reasons. We believe that tradition plays a large part in the preference for dairy farming. Beef production is associated with greater risks and a willingness to borrow money. The predictability and security of a controlled marketing system appeals to many farmers in the Basin. The reluctance to take risks has discouraged beef production.

The lack of a well developed marketing system discourages beef production. The absence of killing plants, other than the small local abbatoirs and a single medium sized plant in Ottawa discourages beef production. The system of selling through local auctions or sending fattened cattle to Toronto, is not ideal. The basic problem is a lack of enough independent buyers. The long distances to major killing facilities also reduces the income one can derive from beef production.

Table 1.2

Budget for Grassing Stockers

Expenses	
Purchase 100 steers, 500 lbs at $.85/lb	$42,500
Feed grain @ $15/head	$ 1,500
Hay @ $10/head	$ 1,000
Salt and minerals @ $4/head	$ 400
Medication/implants @ $5/head	$ 500
Trucking	$ 500
Selling expenses	$ 700
Insurance	$ 100
Interest on purchase price for 6 months @ 16%	$ 4,000
Total	$51,200
Receipts	
Sale 98 steers 725 lbs @ $.80/lb	$56,840
Net Income	$ 5,640

The production and marketing of beef is not controlled or regulated by marketing boards and beef producers are not subsidized by the federal or provincial government. Given the almost unrestricted movement of beef to and from the United States, the industry is strongly influenced by the United States market. Canada has, in the immediate past, been a net exporter of cattle and beef to the United States. Approximately 11% of Canadian production in 1980 was exported to the United States.

There have been discussions of the need for improved marketing systems but production controls and regulations similar to those in the dairy industry are unlikely. Any attempt to regulate production, imports or prices would require a very complex marketing system. To date, no acceptable alternative to the present unregulated system has attained popular support.

Given the international nature of beef price determination, the small scale of production and the present low profit margins, there is relatively little which can be done to stimulate beef production. The discussion of dairy-beef in the following section of this report outlines possible trends. Given the large number of surplus bull dairy calves and present marketing realities, there appears to be more potential for dairy beef than conventioanl beef production.

1.4.4 Dairy-Beef

The potential for producing meat from surplus dairy heifer and bull calves is one which has created considerable discussion but limited consensus. There are a wide range of ways in which the 40,000 to 45,000 dairy calves born in the Basin each year might be used to produce beef.

At the present time we estimate from discussions with knowledgeable persons in the area that the calves move as shown in Figure 2 . These figures are approximate and will vary from year to year. The disposition of heifer and bull calves is quite different. Approximately one-quarter of the heifer calves born are required as replacements for their mothers. Slightly more than one-quarter may be retained on the farm because some heifers have to be culled for a variety of reasons. Some farmers, especially those with registered herds, raise heifers for sale to other farmers both in and outside the Basin.

Bred heifers and cows are regularly sold via auction barns to dairy farmers or drovers from Quebec. A major auction market operator suggests that the export of cows averages 50 per week but reaches up to 200 cows per week during some months of the year. He estimated that 70 percent of the cows and heifers were moving to Quebec. Many others go to New York State.

FIGURE 2

Distribution of Dairy Calves

40,000 Calves

20,000	Heifers	20,000	Bull Calves
4,000	Bob calves for slaughter	11,900	Bob calves for slaughter or vealing outside Basin
1,000	Veal calves	6,000	Veal calves - white, red, heavy
11,000	Herd replacements	2,000	Feeders/steers/dairy beef
4,000	Bred heifers sold outside Basin	100	Breeding bulls

Ontario's trade in dairy cattle to the United States varies from year to year depending upon the relative profitability of milk production in the two countries. Since 1974 Ontario has consistently exported more cattle to the United States than have been imported. In 1979, approximately 25,000 head were exported of which two-thirds were non-purebred. Since approximately 10 percent of the dairy cows in Ontario are located in the Basin, we assume that approximately 2,500 cows per year are exported to the United States. Exports to all countries were almost half as large again as exports to the United States. The total number of head exported were as follows: 1977, 13,280; 1978, 35,507; and 1979, 36,514.

Each year a small proportion of the heifer calves are sold as veal calves at 300-475 pounds in weight. There are various veal feeding programs which will be outlined in a following section of this report. Approximately 20 percent of the heifer calves are sold as "bob calves" at 3 to 14 days of age. These calves may be slaughtered in Montreal or in the United States for processed meats or pet foods or fed to heavier weights by other farmers.

Bull calves follow a somewhat different disposition pattern in that very few are required for replacements. Our estimation of 100 in the Basin allows for both replacements and sales outside the area. It is estimated that just over 10 percent of the bull calves are fed out as dairy beef steers. Many of these steers will be fed on the farm where they are born and some will be killed at local abattoirs for home consumption.

Approximately 30 percent of the steers are believed to be sold as white, red or heavy veal. White veal is produced by feeding Holstein bull calves on an all liquid ration consisting mainly of milk or milk replacer which does not contain iron. They are sold at approximately 300 pounds in weight at relatively high prices for the specialized restaurant trade. The number of white veal producers is limited by the high degree of skill required to raise these calves and the limited market. Most of the white veal operations are located in the Toronto-Kitchener area. White veal production is a highly specialized business which offers a limited market for a small proportion of the veal calves.

Red veal is produced by feeding a combination of milk or milk replacer and grain. These calves are sold at less than 400 pounds at about 18 weeks of age. Most farm-raised veal is of this type. It is estimated that approximately 5,000 calves each year are raised to produce red veal on Basin farms or are sold to farmers outside the Basin for the same purpose.

Heavy veal is produced by feeding calves to approximately 500 pounds on an all-grain ration following weaning. One feed manufacturer has developed a popular program which involves feeding a high protein concentrate with whole or rolled corn. This feeding program appears to be well proven and produces rapid gains in production. This approach to using surplus bull calves has potential for growth in the Basin but requires considerable skill. The potential will be discussed in a following section of the report.

Over half of the dairy bull calves are sold as bob calves at from three to fourteen days of age. These calves go mainly to Montreal for slaughter where they are used to make processed meats or pet food. Some of the bob calves are sold to the United States for slaughter and on occasion, they are flown to Europe. The calves basically go where they can command the highest price depending upon demand. There is a constant trade in bob calves from Eastern to Western Ontario. Most of these calves are used for vealing. The distribution of dairy calves varies over time depending upon the supply and demand for processed meats, veal, replacements, etc. in the Basin, Ontario, Quebec and the northeastern United States.

1.4.5 Potential for Dairy Beef

In general, it appears that a substantial proportion of the dairy calves now being killed or exported outside the Basin at a few days of age could be profitably fed by local farmers. While there are usually good economic reasons for established production and management patterns, the disposal of such a large percentage of bob calves appears undesirable. The sale of bob calves shortly after birth has several advantages for dairymen:

1. It provides a source of ready cash income.
2. Labour, feed and housing space requirements are minimized.

3. The management requirements are very low.
4. The incidence of disease and risk of death losses are low, since most of these problems are transferred to the buyer of the young animal.

A study done for the Ontario Ministry of Agriculture and Food points out that these advantages are off-set by the fact that the animal has a relatively low sale value, and dairymen lose the opportunity to add value to the animal by feeding it to heavier weights. In terms of the efficiency of dairy-beef and veal production for the industry as a whole, there are several additional problems in marketing bob calves through local auctions:

1. Because of the high concentration of animals at sale barns and their susceptibility to disease at early ages, death losses are sometimes very high. Furthermore, buyers of bob calves have little opportunity to distinguish between healthy and unhealthy animals.
2. Prices at local auctions frequently are low enough that many bob calves are purchased for slaughter. Slaughter of calves at these weights is an inefficient use of resources for the industry, because less costly meat of better grades can be produced from heavier animals.
3. Significant numbers of bob calves have been exported to the Eastern United States in recent years. In this case, Ontario farmers lose the opportunity to earn a return to surplus feed and labour by feeding these animals to heavier weights.

While the profitability of beef production varies over time, the opportunity exists for a limited number of specialized heavy veal operations. Such an operation provides an outlet for bull bob calves and locally produced grain corn. A budget for such an operation is included in Table 1.3. The figures were supplied by Mutual Products of Morrisburg on the basis of actual trials at their farm. Similar results have been reported by Kemptville College of Agricultural Technology and farmers in Eastern Ontario.

We believe that a heavy beef enterprise should be considered only by dairy farmers with excess labour and buildings which allow keeping the calves separate from the rest of the herd. A limited number of individuals may establish specialized heavy veal enterprises. In any case, it must be recognized that any type of veal calf production requires a high degree of management and continuous attention to animal sanitation, feeding and health.

The production of heavy veal has been shown to be technically feasible and is attractive as a means of increasing the value of calves by use of grain corn which can be locally produced. The economic viability of heavy veal production is determined primarily by the price of fed cattle. The price of heavy veal is highly influenced by the price of finished beef but tends to fluctuate to a greater extent. This means that veal production is a riskier type of operation than milk production.

The production of finished dairy beef is another possible alternative use of surplus dairy bull calves. Such an operation is very similar to that of a traditional beef feed lot. At the time of writing, beef production is not considered to be profitable. Over the longer run, it is possible that greater numbers of Holstein and crossbred steers can be profitably raised to 1,000 to 1,200 pounds using home grown grains and roughages. While some encouraging research has been done on the feeding and marketing of dairy steers, the production of dairy beef is not very popular despite changes in the grading standards which reduced the price spread between them and traditional beef steers. The utilization of dairy steers is a major issue beyond the scope of this study. It is noteworthy that a recent evaluation of research and development in Agriculture and Food in Canada recommended: "Animal scientists and

Table 1.3

Budget For Grain Veal or Butcher Calf

PERFORMANCE AND COSTS:

0 to 8 Weeks:

Start 100 lbs.	$110.00
Death & Culls 10%	$ 11.00
Medication	$ 5.00
Milk Replacer 25 kg	$ 32.00
Calf Starter Grower 30 kg	$ 7.50
Interest on Calf & Feed @ 15%	$ 4.00
Facilities & Labor 75¢/day	$ 42.00
Weight at 8 weeks - 150 lbs.	$212.00

9 Weeks to 500 lbs. at Market - 130 days:

Start 150 lbs.	$212.00
Culls 1%	$ 2.12
Medication	$ 0.50
Starter Grower 30 kg	$ 7.50
Supplement 85 kg ($275.00)	$ 23.50
Shelled Corn 500 kg ($150.00)	$ 75.00
Bedding	$ 2.50
Interest 15%	$ 17.30
Facilites & Labor 40¢/day	$ 52.00
Cost of Transportation & Marketing	$ 12.58
	$405.00
Break Even Sale Price 81¢/lb.	

	A.D.G.	F.C.	Feed Cost (per lb. grain)
0 to 8 Weeks	0.90 lbs	2.40	80¢
150 to 500 lbs.	2.70 lbs.	3.90	30¢
100 to 500 lbs	2.15 lbs.	3.70	36.5¢

(Source: Mutual Products, Morrisburg, Ontario, September, 1980) marketing specialists should undertake, jointly, projects to determine if the large number of excess calves from the dairy industry in Québec can be raised for beef, profitably."

The potential increase in income from the sale of dairy calves as vealers, feeders or finished beef is substantial. The utilization of these calves as dairy-beef is presently not occurring because of tradition, a ready market for bob calves in Montreal and the relative profitability of milk production. Given the greater returns from producing milk than veal or beef, there is only limited incentive for change. The production of heavy veal and finished dairy beef will probably increase as the number of dairy farms decreases and former dairy producers seek alternative production opportunities. It is also anticipated that a small number of dairy farmers will add a veal or finishing enterprise to utilize labour, buildings, and/or farm produced grain and forage.

1.5 Pork Production

The production of pork is of less importance than dairy or beef production. The number of hog farmers has fluctuated over the past 10 years but appears to have increased very substantially from 1978 to 1980. One of the problems in attempting to describe the hog industry in the Basin is the lack of data because an unknown number of farmers are not registered with the Ontario Pork Producers Marketing Board.

There are three basic types of swine enterprises, namely: weaner; farrow to finish; and finishing only enterprises. Weaner enterprises are more common in the Basin than farrow to finish enterprises. Very few finishing operations exist in the Basin. A high proportion of the pigs born in the Basin are sold as weaners to Quebec where they are finished. This pattern is longstanding and encouraged by income maintenance and feed freight assistance programs in Quebec.

In order to estimate hog numbers in the Basin, we have apportioned the hogs in each of the seven counties in terms of the percentage of the land area in the Basin. The number of hogs in the area has fluctuated widely: 36,000 in 1971; 24,000 in 1976; 36,000 in 1978; almost 42,000 in 1979; and 43,000 in 1980. This fluctuation suggests that hogs are a secondary or sideline enterprise on many farms. This is borne out by the 1971 Census data which indicated that in 1971 40% of the hogs in the Basin area were on dairy farms. In 1976, the only other date for which Census of Agriculture data are available, just 24% of the hogs were on dairy farms.

1.5.1 Production Characteristics

The hog enterprises are difficult to describe because many of the weaner operators sell all or most of their production directly to drovers from or customers in Quebec. An unknown share of this business is on a "cash, no papers" basis. Some of these producers are not registered with the Ontario Pork Producers Marketing Board because they never sell any market hogs or cull sows through the Board. They sell their sows at the local auction barn. These sows may go to Montreal for slaughter or be killed locally by small abbatoir operators.

The number of sows and other pigs in the Basin in 1978, 1979 and 1980 is shown by county in Table 1.4. The total number of pigs increased by 16% from 1978 to 1979 and then by a further 5% to 1980. Total numbers in the three years were as follows: 35,922 in 1978; 41,739 in 1979; and 42,422 in 1980. Sows and boar numbers increased by 23% from 6,221 in 1978 to 7,668 in 1979. A further increase of 7%, calculated on the 1978 base, also occurred in 1980. Sow and boar numbers increased substantially faster than pig numbers. This we believe, reflects an increasing demand for weaner pigs in Quebec during 1979.

The estimated number of finished hogs sold through the Ontario Pork Producers Marketing Board in 1978 and 1979 is shown in Table 1.5. The number of hogs marketed increased by 85% from 18,683 to 34,671 in one year. During the same period, the number of producers increased by 25% from 179 to 224. The average number of hogs sold per producer per year increased from 104 to 155. These figures are estimates which may not be precise for the Basin area but are accurate for the seven counties involved.

The distribution of farms by hogs and hogs produced by size of operation is shown in Table 1.6. These data from the counties which make up and surround the Basin, illustrate that the majority of hog enterprises are relatively small and less concentrated than in the province. Three-quarters of the Basin area hog farms sold 50 or less hogs and only 8% sold over 500 hogs. This compares to 53% and 10% of all Ontario hog farms, respectively. In other words, Basin area hog farms are smaller than in the rest of Ontario.

Table 1.4: Number of Hogs in Basin 1978, 1979 and 1980

County	Sows and Boars			All Other Pigs			Total Pigs		
	1978	1979 Number	1980	1978	1979 Number	1980	1979	1979 Number	1980
Dundas	1,353	1,750	2,150	6,209	7,165	9,552	7,562	8,915	11,700
Glengarry	300	340	320	650	780	1,600	950	1,120	1,920
Grenville	746	1,025	1,025	3,029	4,194	5,592	3,775	5,219	6,617
Ottawa/Carleton	566	685	637	3,540	4,247	2,833	4,106	4,932	3,470
Prescott	1,952	2,380	2,285	8,330	8,568	10,948	10,282	10,948	13,233
Russell	442	530	442	2,914	4,327	1,060	3,355	4,857	1,500
Stormont	862	958	1,245	5,030	4,790	3,736	5,892	5,748	4,982
Total	6,221	7,668	8,104	29,702	34,071	35,321	35,922	41,739	43,422
Province	332,000	415,000	405,000	2,178,000	2,625,000	2,800,000	2,510,000	3,040,000	3,205,000

Table 1.5: Estimated Finished Hogs Marketed In Basin By County For 1978 and 1979

County	Producer		Hogs	
	1978	1979	1978	1979
	Number		Number	
Dundas	49	59	5679	10265
Glengarry	7	8	422	886
Grenville	37	45	2258	3072
Ottawa/Carleton	19	25	2093	2059
Prescott	21	31	4143	11185
Russell	8	15	675	2654
Stormont	38	41	3413	4350
Total	179	224	18683	34671
Average per Producer			104.4	154.8

Table 1.6: Distribution of Farms and Hogs Produced By Number of Animals Shipped In Basin and Ontario, 1979

No. of Animals Sold	Farms		Hogs	
	Basin Counties %	Ontario	Basin Counties %	Ontario
1-50	74.7	53.1	5.1	4.6
51-500	17.3	36.6	32.1	35.6
501-3000	8.0	10.0	62.7	52.6
3001+	-	0.3	-	7.2
Total	100.0	100.0	100.0	100.0

Table 1.7: Ratio of Sows and Boars to Hogs 20 kg and Over and Hogs Sold To Ontario Pork Producers Marketing Board By County, 1979

County	Feeder Pigs 20 kg+ Per Sow/Boar	Pigs Marketed Per Sow/Boar
Dundas	3.14	5.86
Glengarry	1.06	2.61
Grenville	3.00	3.00
Ottawa/Carleton	3.41	3.30
Prescott	1.46	4.70
Russell	4.33	5.01
Stormont	2.95	4.54
Basin Counties	2.84	4.57
Eastern Ontario	2.75	3.64
Western Ontario	4.35	10.16
Province	3.98	9.03

The level of concentration is further shown by the data on hogs in Table 1.6. While 75% of the Basin counties' farmers produced 5% of the hogs, almost two-thirds, 63%, of the hogs were produced by 8% of the farmers. The degree of concentration for all Ontario differed in that the small producers, those who sold 50 or fewer hogs, produced a smaller proportion of all hogs sold. At the other extreme, the less than one percent, 0.3 of the farmers who sold 3000 or more per year, sold over 7% of all finished hogs marketed in 1979.

There are very substantial differences among counties in the Basin Area. Prescott reported both more sows and more pigs in total than all other counties in each year from 1978 to 1980. This is, despite the fact, as shown in Table 1.5 that there are more hog farmers in Dundas 59, Grenville 45 and Stormont 41. It is also interesting to note that the ratio between sows and boars and pigs 20 kilogram or over in weight differs substantially from county to county. As shown in Table 1.7, the number of feeder pigs on farms July 1, 1979 was only slightly larger than the number of sows in Glengarry. In Russell, by contrast, the ratio was 4.33 feeders per sow. This is slightly higher than the provincial average of 3.98.

Another measure of the hog population is the number of hogs marketed in 1979 per sow. Glengarry again is low at 2.61 hogs per sow and Dundas is highest at 5.86 per sow. All Eastern Ontario reports considerably fewer sales to the Ontario Pork Producers Marketing Board than Western Ontario where the ratio is 10.2 pigs per sow compared to the provincial figure of 9.03 finished hogs per sow.

We believe the very low ratios of feeders per sow and finished hogs sales per sow reflect the common practice of selling weaner and feeder hogs to Quebec for finishing. Part of the difference may be due to higher levels of management in other parts of the province but this would be very difficult to document.

1.5.2 Trends

While there has been a general increase in hog numbers since 1978, we can see a greater increase in sow numbers in the Basin than the province. While the number of sows in Ontario decreased 2.4% from July 1, 1979 to July 1, 1980, the number in the Basin increased 5.7%. This increase, while significant in the Basin, has limited impact on the province because only 2.0% of the sows in Ontario are located in the Basin. In 1980, only 7.4% of all the sows in Ontario were in the 12 counties of Eastern Ontario.

1.5.3 Potential

We believe the present situation in which a high proportion of weaner pigs from the Basin are finished in Quebec leaves hog producers at risk. While the system may be very attractive at present, the Basin farmers may lose their market at some time in the future. The government of Quebec has encouraged pork production and there has been a very substantial increase in slaughter in the province. While Quebec only produced 18% of the national kill in 1971, their share has increased to 33% in 1979.

If a supply management system were introduced in Canada, the Eastern Ontario weaner producers could easily lose access to the Quebec market. If such a change were to occur suddenly, many producers could possibly find themselves in a very difficult position. If quota were based on either finished hogs or weaners, the farmers would have to find a new market among Ontario feeders.

Attempts to determine the number of weaner pigs which are exported to Quebec and Central or Western Ontario from published sources proved unsuccessful. The flow of weaners is not constant and probably varies with both feed prices and hog prices. Statistics Canada estimates that well over a quarter of a million weanling pigs move from Ontario to Quebec each year. Their estimates for the past four years are as follows:

1976, 300,000; 1977, 250,000; 1978, 350,000 and 1979, 385.000. Not all these weanling pigs move to Quebec from Eastern Ontario since some are purchased in the Peterborough area and, we understand, that some are moved from as far west as Kitchener.

We have attempted to estimate the number of weaners sold out of the seven counties from the ratio of hogs sold through the Ontario Pork Producers Marketing Board to the number of sows in an area. The ratios are shown for the various counties in Table 1.7. If the same number of pigs per sow had been marketed in the Basin counties as in Western Ontario, the total marketings would have been 185,928. As may be seen in Table 1.8, only 73,508 or approximately 40% of the potential hogs were marketed as finished hogs through the Ontario Pork Producers Marketing Board.

The very substantial discrepancy in number of pigs which can be expected to have been born and the number marketed as finished hogs is probably due to the following factors. The conception and/or survival rate may be lower in the Basin counties than in Western Ontario. We expect the number of hogs marketed per sow is slightly lower in view of variation observed in Table 1.7 among regions. A substantial number of new breeders entered the industry during 1978 and 1979 and their production is probably below average. A very small number of fattened hogs were sold to Montreal or slaughtered locally thus never passing through the Ontario Pork Producers Marketing.Board sales yards. This is not considered to be a major factor.

The most important single reason for low sales relative to the sow herd size is the sale of weanling pigs to Quebec and/or Central Ontario. We estimate that in the order of 100,000 pigs leave the seven counties within which the Basin is located. If the hogs are distributed across these counties in the same proportion as the land area, then approximately 40,000 weanling pigs were exported from the Basin in 1979. This is larger than the 35,000 believed marketed through the Ontario Pork Producers Marketing Board.

Table 1.8: Relationship Between Hogs Marketed and Number of Sows

County	# Sows	Potential Sales	Actual Sales	% of Potential
Dundas	2200	22352	12896	57.7
Glengarry	3400	35544	8862	24.9
Grenville	2200	22352	6593	29.5
Ottawa/Carleton	2900	29464	9572	32.5
Prescott	5000	50800	23498	46.3
Russell	600	6096	3006	49.3
Stormont	2000	20320	9081	44.7
Total	18300	185928	73508	39.5

Whether or not the export of over half the pigs born in the Basin is desirable depends upon one's assumptions. The farmers who have the sows may not have the time or facilities to feed out the pigs exported. From a macro-perspective, the movement of 40,000 weanling pigs out of the area means that a market for at least 12,000 tons of corn, barley or oats has been lost. Also lost are employment opportunities for farmers, the sales of various chemical, machinery and feed supply agencies and transportation services by local truckers. The difference in value of a weanling and a finished pig was approximately $60.00 per head in 1979. Thus the export of 40,000 pigs represented a potential loss of $2.4 million in gross farm income.

1.6 Sheep Production

The production of wool and mutton has traditionally been of limited importance in the Basin compared to dairy, beef or swine. During the past few years, there has been a very substantial growth in sheep numbers throughout Ontario. In 1971, only 45 farmers in the Basin Area reported sheep and they kept only 2,171 animals. In 1976, 83 farmers reported 4,646 animals. The trend is even more significant in that in 1976, two-thirds, 3,023, of the animals were reported by 14 specialized farmers. In 1971, only one such farm existed and it reported only 21 animals.

The trend in the area is toward a few large commercial flocks, some of which are purebred producers and an increasing number of hobby or sideline operations. The low investment and limited management required make sheep an attractive sideline.

As of July 1, 1980, the Ontario Ministry of Agriculture and Food reported 39,000 sheep in Eastern Ontario. The distribution in the seven Eastern counties is shown in Table 1.9. Three quarters of the sheep in the Basin are in Ottawa-Carleton and Dundas counties. The only other county with over 1,000 animals is Grenville.

Table 1.9: Distribution of Sheep In Basin By County, July 1, 1980

County	Sheep One Year & Over	Lambs	Total Sheep
Dundas	2000	1200	3200
Glengarry	50	50	100
Grenville	700	560	1260
Ottawa-Carleton	1960	2200	4160
Prescott	240	95	335
Russell	265	90	355
Stormont	385	145	530
Total	5600	4340	9940

We believe the potential for sheep production is quite good. While there is unlikely to be a major shift to wool and mutton production, there is a steady demand for lamb. Much of the lamb produced in the area is, we understand, sold directly to consumers or indirectly through local slaughter houses. This appears to be a very efficient marketing system for small flock owners who are able to get top prices. We anticipate that more and more semi-retired farmers and part-time farmers will keep sheep. There are a few large purebred and commercial flocks which will probably provide the majority of animals.

2. EGGS AND POULTRY PRODUCTION

2.1 Production Characteristics

Egg production in the Basin tends to follow a structural pattern similar to that of the rest of the province. A relatively small number of large producers sell a very high proportion of the eggs marketed. A substantial number of farms, 456, reported hens or chickens in 1976 but only 62 received the majority of their income from poultry. In 1976, 95.6% of the hens and chickens were located on 62 farms and 96.6% of the hens kept for laying were located on 59 farms.

In 1971, as may be seen in Table 2.1, a total of 497 farms reported 995,836 hens or chickens, but only 75 of these received more than half of their income from poultry sales. These 75 farms had 90.6% of all hens and chickens in the Basin area. Farms with laying hens, in the same year, were 462 in number. These 462 farms reported 708,675 hens and chickens but 649,529 of them, representing 91.4%, were on only 71 farms. Note that while we assume most of the farms with hens and chickens were producing eggs, a minority may be producing broilers for processing or pullets for sale to other farmers.

The data indicate that there are a substantial number of farms which report hens and chickens but on most of them, poultry are only a sideline or minor enterprise. This did not change from 1971 to 1976 and probably is still characteristic of the area. This structure reflects the marketing system which allows any farmer to keep and sell eggs from up to 500 hens. All producers who wish to keep over 500 hens must purchase a production and marketing quota from the Ontario Egg Producers' Marketing Board.

From 1971 to 1976, there was a reduction in the number of farms with birds as well as a reduction of 17% both in the number of poultry farms with laying hens and in the number of laying hens. During

Table 2.1: Distribution of Hens and Chickens In Basin Area

	Year 1971[1]	1976[1]	1980[2]
Total Farms With Hens and Chickens	497	452	-
Number of Hens and Chickens	995,836	870,232	-
Total Farms With Laying Hens	462	349	-
Number of Hens For Laying	708,675	596,409	-
Poultry Farms[3] With Hens and Chickens	75	62	-
Number of Hens and Chickens	902,582	832,307	-
Poultry Farms With Laying Hens	71	59	63
Hens For Laying	649,529	576,186	515,514[4]
Quota	-	-	736,449

[1] Census of Agriculture special run.

[2] Ontario Egg Producers' Marketing Board.

[3] A poultry farm is a farm on which 51% of more of income comes from the sale of poultry or eggs.

[4] Assumes 70% of quota.

the same period, the number of hens, chickens and laying hens decreased on both mixed and poultry farms. There was a reduction in the size of the industry in the Basin Area from 1971 to 1976 which appears to have been primarily due to concentration.

While Census of Agriculture data are not available regarding the total number of farms with hens and chickens, we know there were 63 registered egg producers in 1980. The location of these 63 farmers is shown by township in Table 2.2. Thirty per cent of the commercial egg producers are located in South Plantagenet township. The remainder are scattered throughout the Basin.

The average commercial egg producer had a quota of 11,690 hens. Since farmers are presently allowed to have approximately 70% of their quota, this means the average flock is approximately 8,183 birds. The actual distribution of commercial egg producers by size is shown in Table 2.3.

Almost half, 49.2%, of the producers have a quota of from 5,000 to 9,999 hens and two-thirds, 66.7%, have fewer than 10,000 hens. These operators are by present commercial standards, relatively small. Almost one-quarter of the farms, 22.2%, have a quota of 15,000 or more hens and one-eighth have a quota in excess of 20,000 hens.

The structure of the commercial egg producing farms in the Basin is similar to that of the surrounding counties. As may be seen in Table 2.4, there are 90 commercial egg producers in the seven eastern counties. The farmers are concentrated in Prescott, 41%, and Glengarry, 20%. The average quota is 10,172 hens.

2.2 Egg Marketing

The production and marketing of eggs is controlled by the Ontario Egg Producers' Marketing Board which issued production quotas in 1973. Each province has a share of the national quota determined in

Table 2.2: Number of Producers and Production Quota by Township

Township	# of producers	Total Production Quota # of hens	Average Quota # of hens
Edwardsburg	5	71,534	14,307
Mountain	3	135,091	45,030
Williamsburg	5	52,002	10,400
Winchester	1	10,109	10,109
Osnabruck	2	8,857	4,429
Roxborough	2	15,289	7,645
Kenyon	3	36,769	12,158
Alfred	2	21,916	10,958
Caledonia	9	76,650	8,517
North Plantagenet	3	17,014	5,671
South Plantagenet	19	201,550	10,608
Clarence	2	18,698	9,349
Cambridge	4	33,429	8,357
Cumberland	1	18,092	18,092
Osgoode	2	19,449	9,725
Total	63	736,449	11,690

Table 2.3: Size of Egg Producers in Basin

Production Quota In Hens	# of producers	%
Less than 5,000	11	17.5
5,000 - 9,999	31	49.2
10,000 - 14,999	7	11.1
15,000 - 19,999	6	9.5
20,000+	8	12.7
Total	63	100.0

Table 2.4: Number of Egg Producers In Eastern Ontario

County	# of producers	Total Production Quota	Average
Ottawa-Carleton	6	31,848	5,308
Russell	7	70,219	10,031
Prescott	37	344,256	9,304
Grenville	7	91,294	13,042
Dundas	9	197,202	21,911
Glengarry	18	150,800	8,379
Stormont	6	29,895	4,983
Total	90	915,514	10,172

consultation with the Canadian Egg Marketing Agency. Quotas regulate the number of hens each producer may keep. Prices are established weekly by the Ontario Egg Producers' Marketing Board based on a cost of production formula. Limited imports of eggs from the United States are allowed, when necessary, to balance the supply and demand.

While commercial egg farmers have a quota based on a given number of birds, the actual number of hens allowed is only approximately 70% of quota. This adjustment has been necessary to compensate for the production level during the base period of 1969-1972. Quota is tied to the operator's premises and can only be traded with land and buildings.

Producers with flocks of under 500 hens do not require a quota. Many of the 349 farms with laying hens in 1976 fell into this category. These small flocks are sideline enterprises which provide eggs for the household or for sale. They represent a very small share of total production but provide an opportunity for a farmer to earn in the area of $7,500 to $8,000 per year. The net income of such an operation is obviously considerably less, but for those operators who sell their eggs retail to supplement their income, it may be an important sideline. The policy of allowing small flocks, acts as a safety valve to reduce opposition to the quota system.

The various quota regulations and policies limit the future expansion of egg production. The only increases in production which can be anticipated are directly related to increases in population and/or increases in per capita consumption. Since both are likely to be small and gradual, the potential for increased egg production is slight. The number of registered egg producers has gradually decreased in the Basin Area and, we anticipate, it will continue to decrease. The larger, more efficient producers have been willing to pay very high prices for quota and buildings. The structure of the industry will become more concentrated. The potential for increased production in the Basin is quite limited.

2.3 Turkeys and Chicken Broilers

The number of turkeys and chicken broilers in the Basin is relatively small. The Ontario Turkey Marketing Board reported there are no registered producers in the seven Eastern counties. This means that any turkeys present are on farms with 50 or fewer birds.

The number of broiler and roaster producers is quite small. The Ontario Chicken Producers Marketing Board indicated there are only two producers with registered premises in the area. One in Grenville and one in Stormont. Other contacts identified 12 broiler producers in the St. Isadore de Prescott area, of whom 4 are in the Basin. Some of these producers sold their birds to Quebec prior to the development of the Canadian Chicken Marketing Agency and are presently attempting to acquire Ontario quota. Given the scale of production, the poultry meat industry is of little importance to the Basin. The number of farms reporting turkeys in 1971 was 5 and in 1976, was 21. The number of turkeys reported were 65 and 312, respectively (see Table 2.5).

The major reason for the size of the poultry meat industry in Eastern Ontario is the absence of a poultry slaughtering facility. We were told that most old hens are trucked to Aurora or Kitchener for slaughter. Given the lack of such facilities and the supply management system which ties quotas to premises, there is little likelihood that poultry meat production will increase.

The production of ducks and geese is expected to continue to be of limited importance in the Basin. While the number of producers increased from 1971 to 1976, the numbers of birds involved are still quite small; see Table 2.5. While commercial production is possible, we anticipate the production of ducks and geese will remain a hobby or sideline on livestock or cash crop farms. The absence of poultry slaughtering facilities will preclude major development.

Table 2.5: Number of Turkeys, Geese and Ducks in the Basin Area, 1971 and 1976[1]

Fowl	1971	1976
Farms Reporting Turkeys	5	21
Number of Turkeys	65	312
Farms Reporting Geese	53	82
Number of Geese	566	1323
Farms Reporting Ducks	83	150
Number of Ducks	508	1494

[1] Based on farms with income of $2,500 and over.

3. FIELD CROPS

3.1 Introduction

The pattern of field crop production in the Basin is changing rapidly from a system that produced field crops to sustain livestock, to one that combines the production of livestock feed with production of cash crops.

Historically, the Basin has been an area in which the major emphasis was on milk production. Prior to the introduction of silage corn, the cows were fed on a ration composed of hay, pasture, and coarse grains, primarily oats. In 1961, in Dundas County, for example, there were 26,102 milk cows, 33,728 acres of oats, 5,506 acres of silage corn and only 453 acres of grain corn. By 1976, 22,020 milk cows were supported by 8,477 acres of oats, 18,035 acres of silage corn and 11,280 acres of grain corn. Over the 15 year period, the acreage in tame hay decreased from 64,844 to 58,213 acres. The introduction of corn and barley have meant that fewer acres of hay and pasture are required to feed the dairy herd.

The examination of field crops has concentrated on those crops that are or can be grown extensively in the Basin, and that appear to have a strong future in the area. Two specialty crops, canola and mustard, have been included here because they are oil seeds and therefore should be discussed along with soybeans.

3.2 Commodity Framework

The major field crops produced in the Basin are examined here from the point of view of both production and marketing. Conclusions are drawn as to the potential production of each crop and recommendations are made regarding further study and/or actions required to encourage increased production.

One of the general constraints on the expansion of corn, soybeans and other oilseeds is concern regarding future prices. This is a natural and logical concern, especially if one has not grown the crop before or the marketing system is not well developed. Basically, no one can predict with a high degree of accuracy the future price and/or profitability of a crop which is freely traded on the world markets. In general terms, the international market will determine the price totally independent of the amount produced in Eastern Ontario or Canada.

Ontario farmers grow such a small proportion of the corn, soybeans and other oilseeds produced in North America that our production has practically no effect on prices. Given the relatively free trade in grains and oilseeds, the price in Eastern Ontario will follow the United States prices quite closely. There may of course be occasions on which a severe shortage or surplus of local grains may lead to short term distortions of the market. Alternatively local prices can be depressed by large companies moving substantial quantities of a commodity into Eastern Ontario from elsewhere.

The major issue is not whether Eastern Ontario can sell all the grain and oilseeds likely to be produced without affecting the price. It is whether local farmers can make a profit growing grains and oilseeds at the prices likely to prevail. The answer to the latter question will of course depend upon the absolute price received and the cost of production. In view of the continued increase in world population, the variability in weather, and the inability of countries with planned economies to expand production, we anticipate higher grain and oilseed prices in the long term. This is not to suggest that prices will constantly increase or that prices will always exceed costs. As long as Eastern Ontario remains a net importer of grains and soybean oil meal and Québec is not self-sufficient in these products, local producers should receive the Chicago price plus the cost of transportation.

We believe that Basin farmers can expand production of grain corn, soybeans, oilseeds, and barley without serious concern for over production. They must seriously assess their ability to produce at current prices and to develop improved marketing systems. Poorly developed marketing systems are the single greatest impediment to increased profitable grain production.

Before looking at specific crops, it is appropriate to review in very general terms the effects of fieldwork timeliness and the weather on crop production. When comparing crop production in Eastern Ontario with that of Central, Western, and Southern Ontario, some people fail to recognize that the number of days during which Spring and Fall work may be completed are fewer in Eastern Ontario. An Ontario Ministry of Agriculture and Food Factsheet entitled: "Dollars and Sense of Fieldwork Timeliness" discusses the effect of planting and harvesting dates on maximum yields for various field crops. The basic conclusions are that yields in Eastern Ontario can be more sensitive to timeliness than in Southern Ontario. The introduction of new early varieties however, is offsetting this problem in many instances.

The implications are that if one wants to achieve the same level of fieldwork, one must have substantially larger or more equipment in Eastern than Southern Ontario. A further implication when growing crops on undrained soils is that there is a greater risk of lower crop yields. The failure to get crops planted at the appropriate time will reduce yields as will the failure to harvest in time. One cannot simply consider the number of heat units in various parts of the province and assume that various crops, varieties or yields are directly comparable.

3.3 Corn

The production of both grain and silage corn have increased substantially in the Basin over the past 20 years. From 1971 to 1976, the acreage of grain corn remained relatively stable at about 37,000 acres. Since that time, it has increased to approximately 50,000 acres. During the same period the acreage in silage corn appears to have increased from

42,000 in 1971 to 59,000 in 1976 but then decreased to 40,000 in 1980. Silage and grain corn are relatively interchangeable in the sense that corn not needed for silage may be harvested as grain corn. Similarly, corn intended for grain may be cut for silage or high moisture corn, if needed.

The acreage of corn used for silage is determined by the number of dairy cows and feedlot fattened cattle in the area. The amount of grain corn produced is related to both the amount of corn used for animal feed in the Basin and the amount sold outside for either livestock feed or industrial use.

While Ontario is a net exporter, Canada is a net importer of corn. Total production in Ontario was 169,202,000 bushels (4,298,000 tonnes) in 1979. Canadian production in 1979-80 crop year was 4,963,000 tonnes of which 345,000 tonnes were exported. Imports mainly from the United States were 1,058,000 tonnes.

The supply and disposition of Ontario grain corn from August 1, 1979 to July 31, 1980 is shown in Table 3.1. Under half (44.9%) of the corn, 1,955,900 tonnes, was fed on farms without going through feed mills. Feed mills received and processed 740,400 tonnes into animal feed. Starch companies, breweries and other industrial processors used 851,900.

Imports of American corn into Ontario totalled 425,000 tonnes compared to total exports of 806,400 tonnes. The major export destinations were Québec, 361,400 tonnes and the Maritime provinces, 101,000. International exports, in the time period being discussed, totalled 344,000 tonnes. Much of this corn is reputed to have gone to Cuba and Russia.

TABLE 3.1: Supply and Disposition -Ontario Corn August 1, 1979 - July 31, 1980

		Tonnes	Percent
Supply on hand-August 1		660400	
On Farm		660400	
In elevators		77800	
Feed Manufacturers		25400	
Industrial		35600	
Total		899200	16.0
Production		4298000	76.4
Imports-United States		425000	7.6
Total Supply		5622200	100.0
Disposition			
Exports :	Quebec	361400	8.3
	Maritimes	101000	2.3
	Other	344000	7.9
Total		806400	(18.5)
Industrial		851900	19.6
Feed Manufacturing		740400	17.0
Used on farm		1955900	44.9
Total		4354600	100.0

SOURCE: Canadian Livestock Feed Board

The Canadian Livestock Feed Board estimates just less than half of the Ontario corn exported to Québec from Ontario originates in Eastern Ontario. Québec purchase of Ontario corn is estimated by the Canadian Livestock Feed Board to be as follows:

1975-1976	230,500 tonnes
1976-1977	265,700 tonnes
1977-1978	368,271 tonnes
1978-1979	263,712 tonnes
1979-1980	270,200 tonnes

3.4 Non-Farm Uses of Corn

We anticipate that an increasing proportion of Ontario corn will be used to produce fructose sugar, corn oil and gluten feed. The establishment of fructose sugar plants near London and Port Colborne will provide a market for substantial amounts of corn. In the United States, considerable research and development has been done on on-farm alcohol plants. The Ontario Government has recently indicated support for a similar program.

Based on the present price of gasoline, we question the economic feasibility of converting a high quality product such as corn into alcohol. The data in Table 3.2 suggests that a commercial corn refiner can better utilize corn than an on-farm alcohol plant. It should be noted that in both processes, feed is one of the major by-products. The idea that processing of corn leads to a total loss in animal feed is erroneous. In the future, we may see a major expansion of corn processing with animals being fed the by-products rather than the whole corn. The development of such a system will be determined by factors beyond a farmer's control such as petroleum prices, trucking costs, and labour. The above analysis ignores the capital cost of the two processes. The net returns to the two approaches are unknown but it appears that the extraction of fructose sugar and corn oil prior to the production of alcohol, is desirable.

We believe there is an opportunity to sell additional grain corn to the Canada Starch Plant at Cardinal. Our very preliminary

TABLE 3.2 : Value of A Bushel of Corn For Processing

Alternative I - Commercial Corn Refiner

Products			
Gluten Meal	-	4 lbs @ 15¢/lb	$ .60
Corn Oil	-	1.5 lbs @ 40¢/lb.	.60
Gluten Feed	-	10-12 lbs @ 6-8¢	.77
Fructose sugar or corn syrup	-	40-44 lbs @ 20¢/lb	8.40
Alcohol	-	2.6 gal. @ $160-180	4.42
Total			$14.79

Alternative II - On-Farm Alcohol Plant

Products			
Distillers grains	-	18 lbs @ 7¢/lb.	$1.26
Alcohol	-	2.6 gal. @ $160-180	$4.42
Total			$5.68

Source: Adapted From Ontario Grain Corn Council Market Letter July 15, 1980.

investigation suggested that the possibility of selling high moisture corn to this plant should be investigated (as well as farmer to farmer). It does not make sense for farmers to dry their corn and send it to a plant where water has to be added to bring the corn up to a higher moisture level for processing. Surely a system could be developed which would allow farmers to sell high moisture corn at least during the harvest season. Part of the problem appears to be the absence of a collection system which guarantees the processor adequate sized shipments of consistent high quality corn.

We recommend that a study be conducted of the potential for increased sales of corn to processors both in the area and in Southern Ontario and Québec. The study should consider the requirements of farmers, grain merchants, transporters, and processors. It should include an advisory committee with representatives of each of these levels of the industry.

3.5 Soybeans

Soybeans are a relatively new crop in the Basin. In 1971 and 1976, only 171 and 69 acres respectively were reported by the Census of Agriculture. We estimate that approximately 2,500 acres were grown in 1980. The production of soybeans on a substantial basis is, we believe, likely to occur in the next few years.

The major reason beans were not grown in the past was the lack of varieties which would mature in the area. Newer varieties such as Maple Arrow have proven that on well-drained land they will provide acceptable yields in the area of 30 bushels per acre. While this is very close to the provincial average reported by the Ontario Crop Insurance Commission, yields of 40 - 50 bushels per acre have been reported on different farms in and adjacent to the Basin.

The major outlets for soybeans are presently either for use as a supplement in dairy rations or for crushing in plants in Toronto, Hamilton, and Windsor. A few farmers are reported to be grinding the beans and mixing with silage or other forages. This approach tends to be inefficient in that the value of the oil is not maximized. Soybeans are approximately 22% oil and 78% meal. The meal is an excellent protein supplement and large quantities are fed by Basin area dairy farmers; however, no estimates of the actual amount used are available.

Soybeans offer an alternative cash crop to corn. One of the major advantages of soybeans is the lower cost of production compared to corn, with net returns about the same or even slightly higher than corn. Ontario Ministry of Agriculture and Food estimated the cost per acre to be $190 in 1979 (see Table 3.3). Soybeans fit well into a crop rotation. They require limited amounts of nitrogen, and they are complimentary to corn in the planting and harvesting work load.

We believe there is an excellent potential for soybeans in the Basin. The major constraints on production have been early high yielding varieties, experience in growing, and a market. The newer varieties such as Maple Arrow, Maple Presto and Evans have proven adaptable and dependable, and another promising new variety Maple Amber will be available soon. Local farmers are becoming experienced in cash crop production and generally have suitable equipment. The essentials of soybean production are proper seedbed preparation and planting, thorough weed control - especially with solid planting, and careful combining. There is a need for flexible cutting heads (on combines) in order to harvest the bean pods which are closest to the ground.

The supply and disposition of soybeans and soybean oil meal in Canada is summarized for 1979 in Table 3.4. In 1979, Canada imported 350,991 tonnes of soybeans and the equivalent of 616,283 tonnes of beans in the form of soybean oil meal. In effect, total Canadian production is equivalent to only 41% of the soybeans fed and exported in Canada.

Table 3.3 : Comparative Cost of Production Selected Crops, 1979

Cost Components	Soybeans	Grain Corn	Barley	Winter Wheat	Alfalfa Hay
Seed/Fertilizer/Herbicides	44.50	57.60	26.50	37.75	55.20
Preharvest	37.75	33.50	24.25	25.50	-
Harvesting & Marketing	26.75	64.50	20.50	22.02	104.00
Land	60.00	60.00	60.00	60.00	60.00
Crop Insurance Interest, etc.	20.70	23.00	15.40	19.90	13.50
Total	189.70	238.15	146.65	165.17	232.70
Break Even	.82 ton @ $6.32/bu.	2.3 ton @ $2.65/bu.	1.2 ton @ $2.48/bu.	1.4 ton @ $3.18/bu.	4 ton @ $50.92/ton

Source: Ontario Ministry of Agriculture and Food Budget Committee, January 1979.

TABLE 3.4 : Supply and Disposition of Soybeans and Soybean Meal In Canada, 1979.

Soybeans	Tonnes
Ontario Production	671700
Imports	350991
Total	1022691
Soybean Meal	
Production	617273
Exported	22597
Used In Ontario	297338
Used In Quebec	267604
Used In Atlantic	29734
Imports of United States Meal	
Atlantic	10954
Quebec	114485
Ontario	159941
Manitoba	94523
Saskatchewan	29800
Alberta	48583
British Columbia	22415
Total	480701
Equivalent in beans	616283

Source: Canadian Livestock Feed Board

We believe that consideration should be given to both a short and long term strategy for increased production of soybeans. In the short run, there is need for improved storage and marketing systems. Both on-farm and elevator storage facilities are required. Even more important is the establishment of a marketing mechanism that brings potential growers and purchasers together. At the present time, the system is underdeveloped and all parties appear to suffer from inadequate information. We understand that local growers, elevator operators and processors have begun organizing more effective marketing arrangements.

In the longer term, the issue of a local processing facility is very important. It is our expectations that if handling, storage, transportation and delivery problems can be solved, that soybean production will increase rapidly. Such an increase in production is necessary before the establishment of a local crushing plant.

A crushing plant should be investigated in the context of Eastern Ontario. It should be considered in terms of both locally produced and soybeans from Southern Ontario and the United States. Such a facility would also crush other oilseeds such as canola, mustard and flax. We suggest that the feasibility of such a processing plant be considered in the near future even though local soybeans might not be expected to provide a major share of raw material for several years. Such a plant has major benefits for dairy farmers in Western Ontario, Quebec, and northern New York State, as well as for local cash crop farmers.

There are a number of research projects currently underway in North America to test different vegetable oils as diesel substitutes or blends. Soybean oil is thought to be promising in this regard (as is canola). If this proves to be correct, the economics of small commercial crushing plants and on-farm plants should be examined on the basis of the oil being used as an on-farm energy source and the meal being fed to livestock.

3.6 Canola and Mustard

The production of these and other oilseeds such as sunflowers and flax are unlikely to become of major importance but represents an opportunity for farmers to diversify their crop production. Canola (rape) and mustard are relatively similar in terms of their agronomic requirements. Both are annuals which can be grown on well-drained land. Canola production has been very limited in Eastern Ontario in the past. Approximately 5,000 acres of yellow mustard were grown under contract in Eastern Ontario in 1977.

The growing of mustard in Eastern Ontario began in 1976 and continued for 4 years. While the production of this crop was found to be quite feasible, difficulties were encountered in marketing. At that time, all mustard was contracted for by the Ontario Mustard Growers Limited, an independently owned processing company that subsequently went out of business. On the basis of discussion with staff specialists at the Kemptville College of Agricultural Technology, successful growing of mustard appears to be quite feasible for the area.

The production of yellow mustard is attractive, given a market, if a yield of at least 24 bushels or 1,200 pounds per acre is achieved. The cost of production was estimated to be $80.00 per acre plus land charges in 1978. The contract price that year was 12¢ per pound. In 1981, it is in the range of 16¢ to 18¢ in Western Canada.

The key to mustard production in Eastern Ontario is the existence of a dependable purchaser. A crushing plant in the region would appear to be necessary before many farmers are likely to grow this crop again. The other major impediment to production is the necessity to have adequate and appropriate drying facilities. Because both mustard and canola heat at over 10.5% moisture, it is essential to have some form of drying equipment. Ambient air and stirall driers are used in Western Canada rather than hot air systems.

While canola has not been grown in the area, other than in field trials, it warrants consideration, primarily because of higher potential yields than yellow mustard. Considerably more work has been done on the development of high yielding low erucic acid varieties. Given the substantial acreage of canola in Western Canada, we anticipate further plant breeding will be done. The future potential of canola is likely to increase at a faster rate than for mustard. Costs and returns to canola are similar to mustard. Canola must be swathed in order to prevent shattering but the added yield tends to offset this additional cost.

There is a market currently for canola if it is transported to Windsor but this makes it relatively unattractive compared to corn or soybeans. Generally we believe these two crops plus others such as sunflowers and flax have a role to play as alternative cash crops. The problem is to develop a dependable marketing system with appropriate storage, grading, transportation, contracting and processing facilities. The need for a marketing system for soybeans has already been stated and if undertaken, should include these other soft seed crops.

3.7 Barley, Oats, Mixed Grains

Barley, oats, and mixed grains have played a central role in traditional cropping patterns in the Basin. (See Table 3.5) The acreage in barley decreased from 6,052 to 5,430 acres from 1971 to 1976 and was estimated to be approximately 10,000 acres in 1980. The comparable acreages for oats were 42,960, 35,086 and 25,000, respectively. Oat acreages show a definite downward trend that is likely to continue. The trend for mixed grains is uncertain with 19,246 acres in 1971, 17,353 acres in 1976 and 22,200 acres in 1980.

The total acreage of these three crops combined decreased from 1971 to 1976 but remained relatively unchanged since then. We anticipate that the total acreage of coarse grains will decrease slowly with increases in the production of corn and soybeans. The acreage of barley will likely increase as the acreage of oats decreases. We anticipate barley will increase because of higher yields and higher net returns.

TABLE 3.5 : Acreages of Selected Field Crops In The Basin, 1971, 1976 and 1980

Crop		Total Acreage	
	1971 [1]	1976 [1]	1980 [2]
Tame Hay	156,834	175,484	172,000
Corn Silage	42,066	58,789	39,000
Grain Corn	38,075	36,066	46,500
Grain Oats	42,960	35,086	25,000
Barley	6,052	5,430	10,000
Mixed Grains	19,246	17,353	22,200
Wheat	1,037	2,429	700
Total	306,270	330,637	315,400

[1] Based on special run of Census of Agriculture Basin enumeration areas.

[2] Estimated from Ontario Ministry of Agriculture and Food statistics. Assumes crops are evenly distributed within each county.

Coarse grains at one time produced a substantial share of dairy cattle feed requirements. Corn yields are considerably higher and provide the opportunity for greater net incomes despite higher costs. The future of coarse grains will, we expect, be limited to use as a nurse crop in rotations and as a source of homegrown feed. Barley has a clear advantage in terms of yield over oats and may be used for silage, if desired.

Current research at the Central Experimental Farm suggests that improved varieties of hull-less oats may have new potential for creep feeds, industrial uses, and for human consumption. Recent tests at K.C.A.T. suggest that hull-less oats can be used as an alternative to rice for food.

3.8 Wheat

The production of both spring and winter wheat are limited in the Basin. Winter wheat can only be grown on well-drained soils, otherwise it may winter kill. The wheat acreage in the Basin in 1971 was 1,037 acres and in 1976, 2,429 acres. A small number of farmers in the eastern side of the Basin are reported to have grown spring wheat for five years. Good yields in the range of 50-55 bushels per acre, are reported with the variety Glenlea. This grain is popular with poultry producers because of its protein content which is in the 16% range.

Wheat is more profitable to produce than other coarse grains but can only be sold to the Ontario Wheat Producers Marketing Board. The scarcity of licenced buyers and the delays in payment inherent in a price pooling system have not encouraged wheat production in the area. Wheat production however is attractive, in that, it can be used in a rotation after early harvested soybeans, and that wheat planting and harvest occur at time which do not compete for labour resources.

3.9 Hay and Pasture

Approximately half of the area actively cropped in the Basin is in hay and almost as much is in improved and unimproved pasture. Since the same fields may be used for hay one year and pasture the next, or vice versa, it is very difficult to separate them.

There has been a general trend across the province, for the acreage in hay to reduce as the acreage of corn has increased. The statistics available do not support such a trend in the Basin. It is difficult to reconcile such findings. It appears that the acreage of improved pasture is increasing but there are still many acres of unimproved pasture which would benefit from reseeding and improved management.

Hay and pasture will probably become relatively less important in the future. More emphasis on improved varieties, fertilization and proper management are expected. The sale of hay has limited potential. Basically, hay has not been treated as a crop like corn or barley and the level of management is less than ideal. Local and export markets for hay should be examined and the requirements of these markets should be translated back to the producer level in terms of quantitative and qualitative requirements.

With the introduction of oxygen-limiting silos and increased use of haylage, there is an incentive for dairy farmers to do a better job of managing their forage crops. We anticipate that the production of pure stands of alfalfa will increase, especially on well-drained soils. Alfalfa haylage can provide a dairy farmer with a homegrown source of much of the protein required to feed his milking herd.

We have not undertaken an investigation of an alfalfa dehydrating facility. A prefeasibility study should be conducted to assess current capital and operating costs, as well as markets. Basin farmers are ideally located to market alfalfa pellets to local farmers and Québec and New York State milk producers.

There appears to be a need for better adapted varieties of legumes such as alfalfa to meet growing conditions in the Basin and the rest of Eastern Ontario. Cultivars with better tolerance to local soil moisture conditions and the ability to over-winter are required.

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4. HORTICULTURAL CROPS:

4.1 Introduction

Fruit and vegetable growers in the South Nation River Basin have a long history of commercial production and marketing of their products. The development of the McIntosh apple in Dundas County is one outstanding example. Vegetable production in Cumberland Township for direct marketing in Ottawa is another. More recently the interest of consumers in obtaining farm-fresh fruit and vegetables has led to the development of a new group of producers with pick-your-own (P.Y.O.) operations. At the other extreme a small number of growers have successfully tailored their operations to commercial production of potatoes and turnips for the Ottawa wholesale trade.

Fruit and vegetable crops are grown on many farms in the Basin; however, they do not represent the main source of income to all of these growers. Analysis of Census data indicates that fewer than 5 percent of the farmers in the Basin reported commercial production of fruit and vegetables.

The table below compares some of the changes that took place in fruit and vegetable production in the Basin over the 1971-1976 period.

	Total Acreage		Average Acres/Farm		Number of Farms	
	1971	1976	1971	1976	1971	1976
Vegetables	528	599	9.6	10.7	55	56
Tree Fruits	408	564	11.7	19.7	35	29
Small Fruits	22	33	1.5	2.5	15	13
Potatoes	1626	1261	38.7	43.5	42	29
	2584	2457			147	127

Total acreage of those commodities that could be identified from Census data decreased from 1971 to 1976 by a little more than

125 acres. This change was due to a 365 acre drop in potato production and a 240 acre increase in the production of other fruit and vegetables, with tree fruits accounting for most of the increase. The number of growers producing vegetables increased by 71 over the five year period and the average acreage per farm also increased from about 10 acres to 11 acres per farm. In all other commodities shown the area of production per farm increased but the number of growers decreased, especially in potatoes. No directly comparable data is available for the Basin since the 1976 Census; however, indications are the acreages of small fruits and vegetables are continuing to increase.

The structural analysis of the South Nation River Basin shows that there were 35 growers whose main source of income was from fruit and vegetable production in 1971. By 1976 the number had risen to 51 growers. The change in distribution of the growers is shown in the table below:

Number of Fruit & Vegetable Farms

Township	1971	1976*
Matilda	1	6
Mountain	1	3
Williamsburgh	-	1
Augusta	1	3
S. Gower	1	1
Oxford	2	3
Cumberland	13	17
Gloucester	8	-
Osgoode	5	8
Caledonia	-	1
Cambridge	-	4
Russell	1	2
Roxborough	-	1
	35	51

Basically new growers went into production near existing operations (demonstration effect). Growers in Cambridge Township were

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*Includes farms with $2,500 or more sales.

an exception. The loss of 8 growers in Gloucester was probably due to urban expansion.

Total capital value per farm increased substantially from 1971 to 1976 (see table below).

	1971	Average per farm	1976	Average per farm
Total capital value	$1,842,200	52,634	5,661,900	110,018
Value of land & buildings	1,500,300	42,866	4,810,500	94,324
Value of machinery & equipment	312,000	8,914	787,558	15,442

The percentage increase for 1976 over 1971 per farm was:

Total capital value	+109%
Value of land & buildings	+120
Value of machinery & equipment	+ 73

While the increase in total capital value per farm for fruit and vegetable growers was a substantial one, their operations were relatively small compared with other types of farm operations. For example, a similar table is set out below showing the average capital value of Basin farms that were producing field crops in 1971 and 1976.

	1971 Average per farm	1976 Average per farm
Total capital value	104,820	239,815
Value of land & buildings	69,225	160,533
Value of machinery & equipment	34,025	75,425

The percentage increase for 1976 over 1971 per farm was:

Total capital value	+229%
Value of land & buildings	+232
Value of machinery & equipment	+222

4.2 Market Framework

Analysis of markets for fruit and vegetable production in the South Nation River Basin must go considerably beyond the watershed boundaries of the Basin. When considering commercial-scale production for the fresh market, that market has to be viewed in the context of the entire population of the eleven counties of Eastern Ontario, and how that market is currently supplied. Individual growers in the Basin may well be able to identify specific market opportunities that enable them to sell most of their crop in their local area. There are also market opportunities for quality produce elsewhere - in the export trade or for processing.

This analysis focuses on the Eastern Ontario fresh market for fruits and vegetables. It is a production-deficit area in that large volumes of fresh produce are currently shipped into Eastern Ontario on a daily basis - some of which could be produced in the area. Fruit and vegetable production for export and/or processing in Basin and Eastern Ontario requires large-scale organization, production and capital investments. For example, development of the vegetable producing potential of the muck soils at Moose Creek would require producing, say, carrots for export to United States. To compete effectively in that market, would require a production and processing investment in the order of $5 million.*

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*From Matt Vaulk, Muck Soil Research Station, Bradford, Ontario.

On the demand side, the size of the fresh market for each commodity was estimated by multiplying the Eastern Ontario population for a specific year by the annual Canadian per capita consumption level for the fresh commodity. The resulting figure is the potential size of the market for that commodity.

Example: Potential market for fresh apples in Eastern Ontario

. 1976 population	988,270 people
. 1976 per capita consumption	x 29.53 lbs
. Potential size of market in Eastern Ontario	29,183,613 pounds of fresh apples

This assumes that people in Eastern Ontario consume fresh apples at the same rate as all Canadians. The measure is not intended to be precise. Its purpose is to describe the approximate size of the market.

The eleven county Eastern Ontario market is supplied with fresh fruit and vegetables in these ways:

- local commercial growers
- home gardens
- produce brought in from elsewhere - in Ontario, other provinces, United States, Mexico and from overseas countries

The information about the produce consumed in this market is incomplete. We do not know exactly how much of each commodity is grown in the Basin or Eastern Ontario, nor do we know when and where it is sold. We have to assume that local production is also sold here either directly to consumers or through normal trade channels.

Government fruit and vegetable inspection data provide good information about volume and origin of produce entering the wholesale trade in large centers, such as Ottawa. These data are tabulated monthly. The Ontario Ministry of Agriculture and Food estimates the commercial farm production and value of each fruit and vegetable commodity by county. Additional information was obtained from other studies that are carried out from time to time by specialists from OMAF and the Kemptville College of Agricultural Technology.

4.3 Marketing Structure

The marketing of fresh fruit and vegetables in Eastern Ontario is dominated by the Ottawa wholesale trade, which in turn reflects what is happening in the produce business in Toronto and Montreal. Wholesale and retail prices in Ottawa and Eastern Ontario are governed mainly by the buying and selling patterns of Loblaws, Dominion Stores, I.G.A., and Steinbergs. This market is unique in that it is under strong influence from both Toronto and Montreal because of corporate and trade ties.

The major produce wholesalers serving the retail, hotel, restaurant and institutional trade are National Grocers (Loblaws), M. Loeb (IGA), Provincial Fruit and H. Fine & Sons Foods. Both National Grocers and M. Loeb have large scale temperature controlled storage facilities for a wide range of fruit and vegetables. Provincial Fruit and H. Fine & Sons have similar smaller facilities. Several other small firms are licenced produce wholesalers, marketing a range of produce to retail outlets and restaurants in Ottawa and smaller centers. Established produce wholesalers also serve Eastern Ontario and Basin communities from Hawkesbury, Cornwall, Brockville and Smiths Falls.

The large volumes of fruit and vegetables required on a daily and weekly basis by the retail chain stores has resulted in the establishment of a pattern of produce flows through the wholesale trade that emphasizes quality, continuity of supply and price. Produce brokers, packers and shippers all over North America maintain close and continuing contact with the Toronto, Montreal and Ottawa wholesale trade representatives. This kind of relationship is necessary to maintain a continuous and predictable flow of each commodity into the retail system, as well as into the hotel, restaurant and institutional (H.R.I.) trade. The problem is to ensure that the flow of commodities is maintained from producer to retailer without having to depend on large inventories of fresh produce being held in central storage facilities.

The overall system has evolved in such a way that produce is now stored on-farm or in packer/processor/shipper storage facilities and shipped on order as required. This is possible only because of the flexibility of truck transport. Produce movement by rail is not sufficiently predictable or reliable for the large retail chains, who want to know that they will be able to rely on delivery of a certain volume and quality of produce to fit their weekly advertising programs. This kind of organization in the marketing system puts a premium on reliability and predictability. Produce wholesalers and retailers want to deal with suppliers that can provide an assured level of quality, volume, pack and delivery for the going price.

The emphasis on produce quality and continuity of supply means that small growers cannot assure themselves of a market for their crop in the wholesale trade - unless they are prepared to meet the requirements of that specific market.

Over a period of many years, a number of local vegetable growers, especially in Cumberland Township, have sold their produce directly to consumers from stalls in the Ottawa Byward Market, and more recently, from the Parkdale Market as well. The Navan area growers have developed their own particular system of producing and marketing fresh vegetables some fruits, flowers and seedlings. These are essentially small truck gardens, complete with cold frames or small greenhouses, and geared to family operation. All of their produce is sold through market stalls, leased seasonally from the City of Ottawa, and operated by family members. Most of the produce is purchased by urban families whose preference is for local farm-fresh produce.

Since the early 1970's a new type of grower has emerged in Eastern Ontario in response to trends in our society. These are the pick-your-own operations and roadside stands. Pick-your-own operations (P.Y.O.) in the Ottawa area began mainly with strawberries and sweet corn and have expanded to include a variety of other crops such as raspberries, tomatoes, cucumbers and apples.

Pick-your-own enables a grower to expand or diversify his operations in the production of labour intensive crops, without having to find, hire and manage additional labour at harvest time. He has to be able to organize and manage groups of people that are coming to his operation as customers. Profit-oriented operators are often able to identify additional income opportunities such as adding a roadside stand or selling refreshments, other products, and child entertainment.

There are a small number of growers in the Basin that produce apples, turnips and potatoes for the Ottawa wholesale trade. Their operations are large scale commercial units, fully equipped with handling, packing and storage facilities. These growers have geared their operations to meeting quality, quantity, pack, and delivery requirements of the wholesale trade.

4.4 Trade Survey

A selective survey of wholesale trade representatives was carried out to obtain qualitative information about local produce purchasing patterns. Three representatives were part of large organizations, one was a smaller family business and the fourth was a combined wholesale/ retail operation. Four operated primarily in the Ottawa market and the fifth operated mainly outside that market area.

All five companies purchase local Ontario and Québec produce in season, in varying amounts. Exceptions were large-scale purchases of potatoes and turnips where growers have suitable on-farm storage and packing facilities. Québec-grown cabbage was also specifically mentioned because the grower has been able to supply high quality produce from his storage facility in mid-winter. Estimates of the number of local produce suppliers ranged from about 10 for one wholesaler to 20 for another. No estimates were obtained from the others.

For those who would comment, the basis for selecting local suppliers was produce quality, regular delivery and packaging.

The expressed intention of all the representative interviewed was to buy more local produce. The intention, of course, presumes they will be able to obtain produce that meets trade requirements in terms of quality, quantity, delivery and price. Most trade representatives indicated an interest in all types of local produce, but particularly those crops that are not normally grown in home gardens - such as cauliflower, broccoli, brussel sprouts and pepper squash. Celery and lettuce were also mentioned.

People in the wholesale trade would like to see more produce facilities in Eastern Ontario for sorting, grading, washing, packing and storage. They are not specific as to whether these facilities should be on-farm or off-farm.

One trade representative indicated that he would be prepared to work directly with local suppliers to ensure that their produce meets wholesale/retail requirements. Another specified that he would not, however, he was the only one that was prepared to forward contract with a local supplier for specific volumes of quality produce for the going price at the time of purchase. The other representative was prepared to make verbal agreements with growers to provide quality produce at a competitive price. Another representative stated that growers usually think their product is worth more than the established marketing board price.

Wholesale trade representatives were either not able or not prepared (probably the former) to indicate what proportion of their total produce volume came from local suppliers. One large operator guessed that it was considerably less than five percent of his annual volume.

4.5 Commodity Profiles

A preliminary list of some thirty fruits and vegetable commodities were reviewed to assess their possible production potential in this area. Some are being produced on a commercial scale while others are currently grown in household gardens, pick-your-own operations, for roadside stands or truck gardens. The list of commodities was discussed with a number of people in the industry to assist in selecting the most important or promising crops for further work.

Generally speaking the ability of these crops to grow in the South Nation River Basin is not the problem. The problem is one of identifying a specific market situation for the produce, and being able to meet or exceed market expectations for the crop year after year, at a competitive price. There will always be a few growers who can identify and take advantage of special situations - such as growing an unusual crop, or because their timing of entry into the market was exceptionally fortunate. We have not attempted to deal with these kinds of special situations - whatever their origin.

This work is more broadly based. It deals with fruit and vegetable commodities that generally have some production history in the area, or have considerable promise in the Eastern Ontario environment. Also, there appears to be a growing fresh market for the commodities that are examined here.

Four fruit crops and seven vegetable crops have been examined in some detail in relation to the Eastern Ontario fresh market. Since the size of this market limits the potential for fresh commodity production it is even more limiting when considering the possibility of processing. Therefore examination of processing opportunities would have to consider market requirements and competitive constraints on a provincial and regional basis. Considerations are similar for exports out of Eastern Ontario. An economic feasibility study is needed in this regard.

4.5.1 Apples

Apples are the major fruit crop in Ontario. Total farm value was estimated at $33.5 million in 1979 (see table below). Acreage has remained relatively stable over the past 10 years; however production has increased and farm value has more than doubled. The sharp drop in acreage of apple production between 1976 and 1977 reflects a change from estimating

Year	Acreage	Production '000 lbs.	Farm Value $'000
1975	27,506	290,780	15,931
1976	27,406	260,446	24,873
1977	23,923	284,886	27,442
1978	23,919	315,264	33,909
1979	24,520	310,025	33,516

SOURCE: OMAF Seasonal Fruit & Vegetable Reports.

the acreage to an actual census of trees. The change in producing acreage occurred over a period of several years.

Apples have traditionally been the most important fruit crop in Eastern Ontario, particularly in the western part of the South Nation River Basin. Dundas county is the home of the McIntosh apple which continues to be the dominant variety in the area. More than 75 percent of the apple production in Eastern Ontario occurs in and adjacent to the Basin, in the counties of Dundas, Grenville and Ottawa/Carleton (see tables below). While producing acreage in Eastern Ontario and the three

Eastern Ontario

Year	Acreage	Production '000 lbs.	Farm Value $'000
1975	782	5,809	482.5
1976	725	3,446	362.8
1977	683	8,534	718.7
1978	673	7,223	807.5
1979	634	7,039	881.4

Basin Counties

Year		Acreage	Production '000 lbs.	Farm Value $'000
1976	Dundas	278	1,306	132.1
	Grenville	143	473	47.3
	Ottawa/Carleton	150	795	85.1
		571	2,574	264.5
1979	Dundas	222	2,739	342.4
	Grenville	125	1,279	155.1
	Ottawa/Carleton	145	1,357	174.8
		492	5,375	672.3

SOURCE: OMAF Seasonal Fruit & Vegetable Reports counties decreased between 1976 and 1979, production has increased and farm value has nearly doubled.

Major changes have been occurring within the industry in response to rising production costs and changing market conditions. One of the most important changes has been the shift from standard apple trees to those on size-controlling root-stock (see table below).

Number of Apple Trees in Ontario

Year	Standard Root-Stock	Size-Controlling Root-Stock
1961	831,314	272,619
1966	748,792	426,636
1971	726,184	754,260
1976	605,490	1,254,216

SOURCE: OMAF, Apple Production Costs for Standard and Size-Controlling Trees, Ontario, 1976.

The rate of change has been slower in this part of the Province than elsewhere. In 1976 the St. Lawrence Valley District* had 5 percent of the Ontario apples in standard root-stocks and only 1 percent of those on size-controlling root-stocks.

The changes in apple root-stocks have been accompanied by changes in varieties as well. The 1976 OMAF Tree Fruit Census showed the shifts in patterns for the most popular varieties (see table below).

Apple marketings in Ontario for the fresh and processing markets fluctuate from year to year. The proportion going into the fresh

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*Ottawa/Carleton, Leeds, Grenville, Dundas, Stormont and Glengarry counties.

Shifts in Patterns for the Most Popular Varieties of Apples

Variety	Standard Root-Stock Ontario	Standard Root-Stock St. Lawrence	Size-Controlling Root-Stock Ontario	Size-Controlling Root-Stock St. Lawrence
McIntosh	40%	70%	25%	60%
Northern Spy	20	**	9	-
Delicious	15	**	28	**
Empire	-	-	2	12
Spartan	-	-	6	9

**Less than 1%

market ranged from 45-60 percent over the 1967-1976 period, with the remainder being processed. Typically, the proportion was in the order of 55 percent fresh and 45 percent processed. This pattern does not hold for Eastern Ontario because there is no large scale processing capability, and production is sold to the local fresh market. Processing is limited to on-farm fresh apple cider production.

Imports of apples into Ontario increased dramatically from 1977 through 1979 - as did the value of the imports.

Imports

Year	Quantity '000 lbs.	Value $'000
1977	54,981	9,956
1978	57,991	12,586
1979	73,896	13,413

SOURCE: OMAF, Agricultural Statistics for Ontario 1979

The volume of imported apples increased by 34 percent and the value increased by about 35 percent.

Canadian per capita consumption of apples has been increasing especially for fresh apples (see table below). Fresh per capita consumption rose by 6 pounds from 1966 through 1976, and with the exception of canned apples, per capita consumption in other forms remained stable.

Year	Fresh	Canned	Juice	Frozen	Dried	Sauce	Pie	Total
1966	23.57	0.82	10.59	0.62	0.32	1.66	1.0	38.58
1971	26.23	0.68	8.54	0.38	0.32	1.66	0.79	38.60
1976	29.53	0.04	10.81	0.52	0.40	1.37	0.68	43.35

SOURCE: Hassen, 1979

Apple consumption in Eastern Ontario was estimated for 1979 based on 1976 Canadian per capita consumption levels (see table below).

	'000 lbs.
Fresh	30,297
Canned	41
Juice	11,091
Frozen	534
Dried	410
Sauce	1,406
Pie	698
TOTAL	44,477

The potential market for fresh apples and apple products in Eastern Ontario has been projected to 1996, using 1976 levels of per capita consumption, to show the order of magnitude of anticipated apple needs (see table below).

These projections of the potential market suggest that apple requirements in Eastern Ontario will increase from 1981 to 1996 to about 282,000 pounds per year. The major components in this increase are fresh apples (188,000 lbs) and apple juice (71,000 lbs.). The amount of 282,000

'000 lbs.

Year	Fresh	Canned	Juice	Frozen	Dried	Sauce	Pie	Total
1981	35,439	48	12,973	624	480	1,644	816	52,024
1986	36,856	50	13,492	649	499	1,710	849	54,105
1991	37,987	51	13,906	669	515	1,762	874	55,764
1996	38,691	52	14,164	681	524	1,795	891	56,798

pounds is about 6,700 bushels, equivalent to the production of 16 acres (yield of 423 bu/ac. for the St. Lawrence Valley - OMAF Cost of Production Study, 1976).

Ontario apple growers supplied about 38 percent of the Ottawa wholesale market in 1979, up from 35 percent in 1978 and 1977 (see table below).

1979 Unloadings of Fresh Apples for the Ottawa Wholesale Trade

'000 lbs.

Month	Ont.	Que.	B.C.	Wash.	Chile	France	N.Z.	S.Afr.	Total
Jan.	951	336	397	91	-	154	-	-	1929
Feb.	877	265	404	76	-	99	-	-	1721
Mar.	771	133	514	67	225	-	-	-	1710
Apr.	583	148	586	60	414	-	-	-	1791
May	550	229	487	81	245	-	71	494	2157
June	198	101	146	614	-	-	274	534	1867
July	6	51	-	612	-	-	-	226	895
Aug.	208	284	-	242	4	-	-	33	771
Sept.	721	578	-	259	-	-	-	-	1558
Oct.	1069	366	264	138	-	46	-	-	1883
Nov.	691	189	236	30	-	250	-	-	1396
Dec.	585	133	326	84	-	237	-	-	1365
TOTAL									
79	7210	2813	3360	2354	888	786	345	1287	19043
78	6871	3298	3496	3475	263	539	320	1599	19861
77	7061	2856	5021	3903	209	126	180	1953	20245

SOURCE: Agriculture Canada, 1979)

British Columbia was the next largest supplier with almost 18 percent of the market in 1979 - about the same as 1978 but down from their 25 percent share in 1977. The Québec share was about 15 percent in 1979; down from nearly 17 percent in 1978 but up from the 14 percent share in 1977. Growers in the State of Washington supply only slightly fewer apples in the Ottawa market than Québec growers. The largest off-shore supplier has been South Africa; however, there is increasing competition from Chile, France and New Zealand. Each has its own unique supply pattern during the year which minimizes the competition with each other (except New Zealand versus South Africa). All are, however, in direct competition with Ontario growers who sell in that market throughout the year.

The 11.8 million pounds imported into Ontario for the Ottawa wholesale trade in 1979 represents nearly 1,100 acres of apple production, based on an average yield of 11,000 lbs/acre.

4.5.2 Blueberries

There is no significant cultivated blueberry acreage in Ontario at the present time. Wild or native stands of blueberries are extensive on the Podzolic soils of the Canadian Shield. They are an important local crop in many areas and are usually sold at roadside stands or farmer markets.

Québec, Nova Scotia and New Brunswick have extensive areas where wild blueberry stands are carefully managed. Only British Columbia's blueberry production comes from a cultivated crop. In the U.S., Michigan, New Jersey and North Carolina have large cultivated acreages.

Canadian blueberry production fluctuates widely from year to year from a high 37.5 million pounds in 1966 to a low of less than 16 million pounds in 1968.

The largest producers are Nova Scotia and Québec, followed by B.C., New Brunswick and Newfoundland. Prince Edward Island is the smallest producer on record (OMAF[c], 1979).

Canada is both an exporter and importer of blueberries as shown below:

	Fresh Exports '000 lbs.	Frozen Exports '000 lbs.	Fresh Imports '000 lbs.
1961	4,451	5,552	1,180
1966	15,124	5,780	1,906
1971	4,002	7,438	3,269
1976	3,409	12,911	5,658

SOURCE: OMAF[b], 1979

Canadian per capita consumption of fresh blueberries is relatively low compared to other fruits, and it tends to fluctuate (see table below). It did, however, reach the highest level in 1976 which may reflect an increased use of blueberries by food processors and the baking industry (i.e. blueberry yogurt, blueberry muffins).

1961	0.37 lbs/capita
1966	0.49
1971	0.36
1976	0.61

SOURCE: Hassan, 1979

Based on 1976 Canadian per capita consumption, the potential market for fresh blueberries in that year in Eastern Ontario was about 603,000 pounds and 626,000 pounds in 1979. Projecting forward to 1996, using the same level of per capita consumption, the potential for blueberry consumption and production will be:

	Projected Blueberry Consumption	Potential Production Acreage* (Fresh)
1981	732,000 lbs.	92
1986	761,000	95
1991	785,000	98
1996	799,000	100

*Based on an expected yield of 8000 lbs/acre for cultivated low-bush blueberries. (OMAF Task Force Report, 1979)

This indication of market potential may well be low given the fact that wholesale unloadings of fresh blueberries in Ottawa have doubled over the three years from 1977 to 1979, from 132,000 pounds to 277,000 pounds (see table below). The 1979 volume in the wholesale trade represents about 35 acres of cultivated blueberries.

1979 Unloadings of Fresh Blueberries for the Ottawa Wholesale Trade

'000 lbs.

	Nova Scotia	Quebec	Michigan	New Jersey	N.Carolina	Total
Jan.	-	-	-	-	-	-
Feb.	-	-	-	-	-	-
Mar.	-	-	-	-	-	-
Apr.	-	-	-	-	-	-
May	-	-	-	-	-	-
June	-	-	-	13	45	58
July	-	1	-	99	-	100
Aug.	-	63	24	24	-	111
Sept.	2	5	1	-	-	8
Oct.	-	-	-	-	-	-
Nov.	-	-	-	-	-	-
Dec.	-	-	-	-	-	-
TOTAL						
1979	2	69	25	136	45	277
1978	1	3	17	111	31	163
1977	-	8	-	99	25	132

SOURCE: Agriculture Canada, 1979

The major fresh suppliers in the Ottawa market have been New Jersey and North Carolina. Quebec and Michigan have taken a major share of Ottawa wholesale market as it has expanded.

The potential of low-bush blueberry production, processing and marketing in Ontario has been examined and reported on by the Blueberry Task Force, Ontario Ministry of Agriculture and Food, May 1979. They see a continuing strong demand for fresh, frozen and processed blueberries in North America and Western Europe. While part of this demand can be met by management of wild stands, the Task Force concluded that cultivation of low-bush blueberries offers a new high value crop that is particularly well suited to some of the acid soils in Eastern Ontario.

Eastern counties that have soils classed as moderate to strongly acid which are generally suited to blueberry production, are shown below. The total area is more than 380,000 acres, much of which is within the South Nation River Basin.

Ottawa/Carleton	95,100 acres
Russell	79,000
Grenville	63,000
Prescott	56,000
Stormont	39,700
Dundas	25,200
Glengarry	23,400
TOTAL	381,400

SOURCE: OMAF^c, 1979

Of this total acreage, the acid sandy soils are the most ideally suited to blueberry production. These include St. Samuel, Uplands, Rubicon and similar soil series. It is estimated that there are well over 100,000 acres in the Basin that would be ideally suited to blueberry production, however, much of this acreage is not likely to be available because of current ownership or use.

4.5.3 Raspberries

Ontario cultivated raspberry production has been declining since the late 1940's. Factors include disease problems, low returns and increasing scarcity of family labour (Ricketson, 1973). The acreage stopped declining in 1977 and increased very slightly in 1978 and 1979 (see table below).

Ontario	Acreage	Production '000 qts	Yield qt/a.	Farm Value $'000
1974	771	727	943	552
1975	619	601	971	534
1976	580	589	1,016	600
1977	558	645	1,156	695
1978	563	599	1,064	707
1979	571	681	1,193	885

SOURCE: OMAF[a], 1974-1979

About 1/3 of the production is in the Central Ontario region (Durham, Northumberland, Prince Edward, Victoria counties) and less than 10 percent in Eastern Ontario.

There were only 50 acres of cultivated raspberries in Eastern Ontario in 1974 (see table below). The area dropped to 33 acres in 1977-78

	Acreage		Production	Yield	Farm Value
	bearing	non-bearing	'000 qts	qt/a.	$'000
1974	50	12	62	1,240	49.1
1975	47	8	43	915	39.7
1976	42	10	46	1,095	49.5
1977	33	4	46	1,394	47.5
1978	33	25	22	970	45.9
1979	49	16	41	837	52.7

SOURCE: OMAF[a], 1974-1979

and then rose back to about the earlier level by 1979. The largest producing area was 19 acres in Ottawa/Carleton in 1979 that are part of P.Y.O. operations. Yields per acre are comparable to the provincial average but appear to fluctuate more.

Canadian per capita consumption of raspberries dropped over the 1966-1976 period in all categories. The largest drop was in per capita consumption of fresh product and the least change occurred in the consumption of frozen raspberries.

	Fresh	Frozen	Canned	Total
		- pounds -		
1966	0.68	0.56	0.10	1.34
1971	0.45	0.55	0.04	1.04
1976	0.05	0.44	0.05	0.54

SOURCE: Hassan, 1979 and Statistics Canada, 1979

The potential market for fresh raspberries in Eastern Ontario was estimated to have been about 52,000 pounds (0.05 lbs/capita x 1,026,000 people) in 1979. The market for frozen raspberries at that time was about 451,000 pounds.

The projected market for raspberries in Eastern Ontario to 1996 is shown below, based on 1976 per capita consumption patterns.

	Fresh	Frozen	Canned	Total	Potential Production Acreage (Fresh)
		- '000 lbs -			
1981	60.0	528.0	60.0	648.0	55
1986	62.0	549.0	62.0	673.0	56
1991	64.3	566.0	64.3	694.6	58
1996	65.5	576.5	65.5	707.5	60

Raspberry consumption is projected to grow very little by 1996 - only about 5,500 lbs./yr. including all forms; however, this could well be a situation where an increase in local supply would lead to increased consumption. Fifty five hundred pounds in about 5 acres.

Unloadings for the Ottawa wholesale trade in 1979 total 38,000 pounds of fresh raspberries, the same as 1978. This represents a 14,000 pound increase over the 1977 volume of 24,000 pounds (see table below).

1979 Unloadings of Fresh Raspberries for the Ottawa Wholesale Trade

'000 lbs.

	Ontario	Quebec	B.C.	Calif.	Total
Jan.					
Feb.					
Mar.					
Apr.					
May					
June					
July		26	7		33
Aug.					
Sept.					
Oct.			4		4
Nov.			1		1
Dec.					
TOTAL					
1979	-	26	12	-	38
1978	2	29	6	1	38
1977	-	24	-	-	24

SOURCE: Agriculture Canada, 1979

Quêbec was the major supplier to the Ottawa wholesale market in 1979. The only other supplier was British Columbia. Quêbec had 68 percent of the market and B.C. had 32 percent. In those three years, Ontario growers only marketed 2,000 pounds to wholesalers and that was in 1978.

4.5.4 Strawberries

Commercial strawberry acreage in Ontario increased by 30 percent from 1974 through 1979 (2,119 acres to 2,762 acres). Over the same period, production doubled and farm value increased from $3.7 million to more than $9 million (see table below). Also, there has been a significant improvement in yield per acre of about 50 percent.

Ontario	Acres	Production '000 qts	Yield qt/a.	Total Farm Value $'000
1974	2,119	8,828	4,166	3,737
1975	2,014	10,595	5,261	4,986
1976	2,034	11,806	5,804	5,762
1977	2,163	14,148	6,541	7,196
1978	2,681	17,543	6,543	8,654
1979	2,762	17,485	6,330	9,031

SOURCE: OMAF[a], 1974-1979

Imports of fresh strawberries in Ontario increased over the 1977-1979 period by more than 1.3 million pounds or about 12 percent (see table below).

	Quantity '000 lbs	Value $'000
1977	11,213	4,123
1978	12,391	5,076
1979	12,547	5,979

SOURCE: Hassan, 1979

Eastern Ontario strawberry production has been increasing more rapidly than the provincial trend (see table below), however, yields per acre have remained lower than the Ontario average. Acreage, production and farm value all increased by more than threefold over the six-year period. Average per acre yields appear to hold about 20 percent below the provincial average.

Eastern Ontario	Acres bearing	Acres non-bearing	Production '000 qts.	Yield qt/a.	Total Farm Value $'000
1974	96	43	476	4,858	210.1
1975	98	52	461	4,704	192.4
1976	110	49	501	4,555	257.3
1977	116	74	579	4,991	318.1
1978	208	117	1,230	5,913	704.5
1979	312	183	1,715	5,497	993.0

SOURCE: OMAF[a], 1974-1979

The major producing counties in Eastern Ontario are Dundas, Grenville, Leeds and Ottawa/Carleton. A comparison of strawberry production in those counties in 1976 and 1979 is shown below.

	1976			1979		
	Acres bearing	Acres non-bearing	Production '000 qts	Acres bearing	Acres non-bearing	Production '000 qts
Dundas	5	4	40	23	7	106
Grenville	8	3	33	53	9	323
Leeds	18	8	72	30	12	111
Ottawa/ Carleton	12	6	48	70	59	382
TOTAL	43	21	193	176	87	922

SOURCE: OMAF[a], 1976 and 1979

Production increases have been dramatic in these counties, reflecting the growth of the pick-your-own market. This rate of growth is unlikely to continue as the P.Y.O. market, according to some growers, may be nearing saturation.

Canadian per capita strawberry consumption increased by 0.57 pounds from 1966 to 1976, mainly because of higher consumption of fresh fruit (see table below).

Per Capita Consumption - Pounds

	Fresh	Canned	Frozen	James & Jellies	Total
1976	1.62	0.10	1.04	2.06	4.82
1971	1.95	0.07	1.26	1.63	4.92
1976	2.45	0.05	1.10	1.79	5.39

SOURCE: Hassan, 1979

Applying the 1976 per capita consumption figures for fresh strawberries and total strawberries consumed to the 1979 Eastern Ontario population, the potential market for strawberries in that year was about:

Fresh	2,514,000 lbs.
Total	5,530,000 lbs.

Using the 1976 per capita consumption levels and projected population growth in Eastern Ontario, the potential market for strawberries will increase at an annual rate of 16,000 pounds of fresh strawberries and 19,000 pounds of canned, frozen, jams and jellied strawberries, for a total annual increase of 35,000 pounds per year.

	Fresh '000 lbs	Total '000 lbs	Potential Production Acreage (Fresh)
1981	2,940	6,469	428
1986	3,058	6,727	445
1991	3,152	6,934	458
1996	3,210	7,062	467

Ottawa wholesale unloadings of fresh strawberries in 1979 were lower than either of the two previous years (see table below). Unloadings were 2.2 million pounds in 1977, increasing by 17 percent for 2.6 million pounds in 1978 then declining to just under 2.2 million pounds in 1979.

1979 Unloadings of Fresh Strawberries for the Ottawa Wholesale Trade

'000 lbs.

	Ont.	Que.	Calif.	Florida	Mexico	Total
Jan.	-	-	-	50	3	53
Feb.	-	-	-	21	-	21
Mar.	-	-	7	7	-	14
Apr.	-	-	235	-	-	235
May	-	-	661	-	-	661
June	312	240	222	-	-	774
July	-	209	34	-	-	243
Aug.	-	-	57	-	-	57
Sept.	-	-	49	-	-	49
Oct.	-	-	38	-	-	38
Nov.	-	-	-	-	3	3
Dec.	-	-	-	-	21	21
TOTAL						
1979	312	449	1303	78	27	2169
1978	612	222	1555	143	75	2607
1977	399	196	1509	96	25	2225

SOURCE: Agriculture Canada, 1979

The change between 1978 and 1979 corresponds with the sharp increase in Eastern Ontario production in the same period. Unloadings from Ontario growers fell to nearly half their 1978 level, which suggests that P.Y.O. opportunities were more attractive and profitable than producing for the wholesale market.

California has been the dominant source of supply in the Ottawa wholesale market. In the 1977-1979 period, California growers supplied 60-68 percent of the market. This volume dropped by more than 200,000 pounds in 1979 but this volume of berries was replaced on the Ottawa market by Québec growers.

Sales of Québec strawberries in the Ottawa wholesale market more than doubled, from 222,000 pounds in 1978 to 449,000 pounds in 1979.

More than 1 million pounds of strawberries, or almost half of the 1979 wholesale unloadings occurred in June and July. The market share over those two months was:

Ontario	31 percent
Québec	44 percent
California	25 percent

This indicates a potential for annual import replacement of 600-700,000 pounds for Ontario strawberry growers in the Ottawa wholesale market.

4.5.5 Asparagus

The acreage of asparagus in Ontario rose from 2,279 bearing acres in 1971 to a high of 2,933 in 1976. The acreage fell to 2,400 acres in 1978 as many growers became discontent with poor crops and low yields. However, preliminary estimates indicate that the 1979 Ontario asparagus acreage had risen to 2,551 acres.

Average yields dropped from 1,900 pounds per acre in 1969-1971 to less than 1,500 pounds in 1975-1977. The 1978-1979 yields per acre were about 1,600 pounds. The decrease in yields may reflect the age of the asparagus patches in production. The ratio of bearing to non-bearing acreage increased from about 7:1 over the 1969-1974 period to almost 15:1 in the 1975-1977 period, which suggests that growers were not replacing old patches.

Rising production costs, lower yields, and higher prices in the fresh market have resulted in a marked shift in how the crop has been sold in Ontario. Over the 1969-1971 period, 67 percent of the crop was sold to processors through the Ontario Asparagus Growers Marketing Board.

By 1977 only 47 percent was sold for processing.

Asparagus production averaged 4.3 million pounds in the 1969-1971 period. It fell to a low of less than 3.8 million pounds in 1978 and rose again to nearly 4.0 million pounds in 1979. (McKibbon, 1979)

Trends in the disposition of the crops are shown below:

	Total	For Processing	Fresh Market
1969-71	4.3 million lbs.	2.8 million lbs.	1.5 million lbs.
1977	3.9 million lbs.	1.8 million lbs.	2.1 million lbs.

SOURCE: McKibbon, 1979

Ontario imports of fresh asparagus over the 1977-1979 period were:

1977	2.3 million lbs.
1978	1.7 million lbs.
1979	2.4 million lbs.

SOURCE: OMAF[b], 1979

Asparagus production is very limited in Eastern Ontario. The entire acreage is probably less than that of one grower elsewhere in the Province, ranging from 15 acres to 27 acres over the last five years (20 acres per grower was the average among 10 growers in the 1977 production study).

Per capita consumption of fresh and canned asparagus in Canada was relatively stable from 1961 to 1971. Between 1971 and 1976 the per capita consumption of fresh asparagus more than doubled.

	Fresh	Canned	Total
1961	0.36 lbs.	0.48 lbs.	0.84 lbs.
1966	0.21 lbs.	0.54 lbs.	0.75 lbs.
1971	0.21 lbs.	0.62 lbs.	0.83 lbs.
1976	0.58 lbs.	0.62 lbs.	1.20 lbs.

SOURCE: Hassan, 1979

Applying the Canadian per capita consumption level of 1976 to the Eastern Ontario population of 1979 indicates that the market potential for asparagus that year was in the order of 1.23 million pounds.

Using the same per capita levels and applying them to the projected Eastern Ontario population for the period 1981-1996, the following pattern of asparagus requirements emerges:

	Fresh/lbs.	Total/lbs.	Potential Production Acreage (Total)
1981	696,100	1,440,100	758
1986	723,900	1,497,700	788
1991	746,100	1,543,400	812
1996	759,900	1,572,300	828

Some indication of the sources of supply of fresh asparagus for Eastern Ontario can be seen from monthly unloadings in Ottawa for the wholesale trade in 1979 (see table below).

1979 Unloadings of Fresh Asparagus for the Ottawa Wholesale Trade

'000 lbs.

		Ontario	Quebec	California	Mexico	Total
Jan.		-	-	-	-	0
Feb.		-	-	4	1	5
Mar.		-	-	-	26	26
Apr.		-	-	42	19	61
May		9	8	35	-	52
June		22	8	-	-	30
July		4	-	-	-	4
Aug.		-	-	-	-	0
Sept.		-	-	-	-	0
Oct.		-	-	-	-	0
Nov.		-	-	-	-	0
Dec.		-	-	-	-	0
Total	'79	35	16	81	46	178
	'78	7	29	45	25	106
	'77	5	46	154	-	205

SOURCE: Agriculture Canada, 1979

Looking at the proportion of the fresh market supplied by Ontario growers in 1979, the percentages by month were:

May	17 percent
June	73 percent
July	100 percent
1979 Total	20 percent

If this distribution is also representative for the entire fresh market in Eastern Ontario, then 80 percent or some 470,000 pounds were imported into the Province from elsewhere. This represents some 247 acres, based on 1969-1971 average yield figure of 1,900 pounds per acre.

4.5.6 Broccoli

Broccoli statistics and production information are incomplete because it has been a minor crop in Ontario. Production in 1973 was about 300,000 pounds from 50 acres. (Fisher, 1975). In 1974 the acreage doubled and by 1979 the area of production had risen to 475 acres, with a marketed production of nearly 2.6 million pounds. (OMAF^b, 1979) The average yield in 1979 was 5,400 pounds per acre.

There is no data on area of broccoli production in Eastern Ontario. Small volumes are produced annually and sold at roadside stands.

Imports of fresh broccoli into Ontario rose sharply over the 1977-1979 period:

	Quantity '000 lbs	Value $'000
1977	16,301	2,918
1978	16,696	3,330
1979	20,630	4,243

SOURCE: OMAF^b, 1979

In spite of the dramatic increase in production in the Province, imported fresh broccoli makes up about 90 percent of the total consumed.

Canadian per capita consumption of fresh and frozen broccoli has been increasing sharply:

	Fresh	Frozen	Total
1966	0.43 lbs.	0.17 lbs.	0.50 lbs.
1971	0.75 lbs.	0.26 lbs.	1.01 lbs.
1976	1.59 lbs.	0.40 lbs.	1.99 lbs.

SOURCE: Hassan, 1979

On the basis of the 1976 level of Canadian per capita consumption, the amount of fresh broccoli consumed in Eastern Ontario in 1976 was about 1.57 million pounds, rising to 1.63 million pounds in 1979.

Projecting this trend pattern forward at the same level, the market potential in Eastern Ontario will be:

	Fresh	Potential Production Acreage (Fresh)
1981	1,908,179 lbs.	353
1986	1,984,448 lbs.	367
1991	2,045,328 lbs.	379
1996	2,083,272 lbs.	386

Sources of fresh broccoli supply to Eastern Ontario are shown in the monthly unloadings for the Ottawa market (see table below).

1979 Unloadings of Fresh Broccoli for the Ottawa Wholesale Trade

'000 lbs.

	Ontario	Quebec	California	Total
Jan.	-	-	269	269
Feb.	-	-	138	138
Mar.	-	-	246	246
Apr.	-	-	12	12
May	-	-	249	249
June	-	-	143	143
July	-	49	32	81
Aug.	10	95	6	111
Sept.	2	108	2	112
Oct.	2	21	94	117
Nov.	-	-	167	167
Dec.	-	-	153	153
Total '79	14	273	1,619	1,906
'78	16	176	1,632	1,824
'77	36	147	1,846	2,029

SOURCE: Agriculture Canada, 1979

The major source of supply throughout the year is California, with Québec being the dominant supplier in August and September and gaining an increasing share of the market over the 1977-1979 period.

Total imports for the months of July through October in 1979 were 407,000 pounds - equivalent to 75 acres of production. Applying these proportions to the estimated Eastern Ontario consumption indicates that the production potential was in the order of 300 acres in 1979.

4.5.7 Brussels Sprouts

Brussels Sprouts are a minor crop in Ontario. 1973 production for the fresh and processing market was estimated to be 760,000 pounds grown on 152 acres, for an average yield per acre of 5,000 pounds. (Fisher, 1975) Production in 1979 was more than 3.2 million pounds on 454 acres, averaging 7,100 pounds per acre. Ontario crop value to the growers was estimated to be about $1.1 million, based on a price of 33.8¢ per pound.

There does not appear to be any significant acreage of brussels sprouts in Eastern Ontario, although they are available in some stalls at farmer markets. (OMAF^b, 1979)

Brussels sprout imports into Ontario over the 1977-1979 period varied considerably:

	Quantity '000 lbs.	Value $'000
1977	3,631	933
1978	1,751	545
1979	3,349	1,037

SOURCE: OMAF^b, 1979

Per capita Canadian consumption is increasing primarily due to the availability of frozen brussels sprouts:

	Fresh	Frozen	Total
1966	0.23 lbs.	0.09 lbs.	0.32 lbs.
1971	0.16 lbs.	0.22 lbs.	0.38 lbs.
1976	0.27 lbs.	0.29 lbs.	0.56 lbs.

SOURCE: Hassan, 1975

Multiplying 1976 per capita consumption times the population of Eastern Ontario in that year, indicates that the market potential was almost 270,000 pounds. Assuming an average yield of 7,100 pounds per acre, this level of production would represent about 38 acres. Similarly, using 1979 population figures the market potential was 277,015 pounds requiring about 39 acres.

Projecting market potential, based on 1976 per capita consumption and anticipated population growth in Eastern Ontario, the potential for brussels sprouts will be:

	Fresh Quantity	Potential Production Acreage (Fresh)
1981	324,000 lbs.	46
1986	337,000 lbs.	47
1991	347,000 lbs.	49
1996	354,000 lbs.	50

Sources of fresh brussels sprouts supply to Eastern Ontario are shown in the monthly unloadings for the Ottawa market (see table below).

1979 Unloadings of Brussels Sprouts for the Ottawa Wholesale Trade

'000 lbs

	Ontario	Quebec	California	Florida	Other U.S.	Mexico	Total
Jan.			43			2	45
Feb.			27	15		22	64
Mar.			54				54
Apr.					1	6	7
May							-
June							-
July							-
Aug.		14					14
Sept.	3	15					18
Oct.	27	11	17				55
Nov.		5	20			25	50
Dec.			92				92
Total							
'79	30	41	253	15	1	55	399
'78	60	45	130	43	13	-	287
'77	22	35	209	47	16	-	329

SOURCE: Agriculture Canada, 1979

The most revealing figures from the table above are the total annual unloadings of brussels sprouts in the Ottawa market for 1977-1979. The actual unloadings are far in excess of the estimated market potential for all of Eastern Ontario. This indicates that per capita consumption in Ottawa market is far in excess of the national levels of per capita consumption. The estimated market potential for fresh brussels sprouts in Eastern Ontario was 277,015 pounds, while actual unloadings at Ottawa were 399,000 pounds.

California is the dominant supplier in the Ottawa market with a 63 percent share in 1979. Sales from Ontario growers have fluctuated, from 22,000 in 1977 up to 60,000 in 1978, and back down to 30,000 pounds in 1979. By comparison the Québec share held relatively steady; however, Québec growers marketed their produce over a four month period, while Ontario growers only marketed in two of those four months.

The Ottawa wholesale market for brussels sprouts in the 1979 August-November period was 137,000 pounds, of which Ontario supplied 22 percent. The remaining 107,000 pounds represented a potential wholesale market for about 15 acres of production.

4.5.8 Cabbage

Cabbage production in Ontario has been increasing over the last 10 years because of the strong demand for cole slaw in the H.R.I. trade. Production increased by nearly 31 percent in volume from 1971 to 1979 and yields per acre increased by 18 percent. Farm value rose from $2.2 million to almost $5.4 million.

	Acres No.	Ave. Yield per Acre	Production	Farm Value
		'000	'000 lb.	$'000
1971	2,799	30.1	83,700	2,212
1976	3,024	35.1	100,978	3,956
1979	3,201	35.4	109,595	5,377

SOURCE: Fisher, 1975 and OMAF[a], 1975-1979

Eastern Ontario cabbage production decreased between 1975 and 1979 from a high of 191 acres in 1977 to 143 acres in 1979.

	Acres No.	Ave. Yield per Acre	Production	Farm Value
		'000	'000 lb.	$'000
1975	158	20.5	3,240	128.4
1976	155	21.6	3,350	167.5
1977	191	23.4	4,474	198.5
1978	159	21.0	3,334	200.1
1979	143	22.4	3,198	133.6

SOURCE: OMAF[a], 1975-1979

Production in the 6 counties recording cabbage ranged from a low of 6 acres each in Russell and Grenville to 74 acres in Ottawa/Carleton.

Imports of fresh cabbage into Ontario decreased by 7 million pounds between 1977 and 1979:

	Quantity '000 lbs.	Value $'000
1977	37,826	4,241
1978	36,557	3,676
1979	30,813	3,433

SOURCE: OMAF[b], 1979

Canadian per capita consumption of cabbage increased dramatically between 1966 and 1976:

1966	9.56 lbs.
1971	10.41 lbs.
1976	14.43 lbs.

SOURCE: Hassan, 1979

At the 1976 level of per capita consumption the market potential for cabbage in Eastern Ontario in 1979 was about 14.8 million pounds.* This is equivalent to 661 acres on the basis of the average yield for 1976 in this area (22,400 lbs./acre).

Using the same per capita levels and applying them to the projected Eastern Ontario population for the period 1981-1996, the following pattern of cabbage requirements emerges:

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*Obtained by multiplying the level of per capita consumption by 1979 population.

	Projected Cabbage Consumption	Potential Production Acreage (Fresh)
1981	17,318,000 lbs.	773
1986	18,009,800 lbs.	804
1991	18,562,000 lbs.	828
1996	18,907,000 lbs.	844

The pattern indicates that the market potential will increase at the rate of 105,900 pounds per year, which is roughly equivalent to 4.7 acres of new cabbage production each year.

The major source of imported cabbage for Eastern Ontario is Québec. Unloadings to Ottawa wholesalers in 1979 are shown in the table below. Ontario growers produced 11 percent of the 1979 unloading in Ottawa, while Québec produced 59 percent, with the remainder coming from U.S. points.

1979 Unloadings of Cabbage for the Ottawa Wholesale Trade

'000 lbs.

	Ont	Qué	Calif	Florida	New York	Carolina + NJ	Texas	Total
Jan.	50	538		191	160		3	942
Feb.	43	318		132	1			494
Mar.	11	97		224	37		27	396
Apr.	13	11	38	357			38	457
May	3			427			192	622
June	20	216	3			302	49	590
July	135	584						719
Aug.	93	649						742
Sept.	67	537						604
Oct.	90	607						697
Nov.	160	414						574
Dec.	104	383						487
Total								
'79	789	4354	41	1331	198	302	309	7324
'78	1466	3152	-	1967	100	195	476	7356
'77	533	3399	3	1488	-	435	1003	6861

SOURCE: Agriculture Canada, 1979

The potential market in the Ottawa wholesale trade for additional Ontario cabbage in 1979 was 6.5 million pounds, which is equivalent to about 290 acres of production.

4.5.9 Cauliflower

In the six-year period 1968-1973, Ontario growers produced an annual average of 22.8 million pounds of cauliflower on 1,510 acres. Production in 1976 was 27.9 million pounds from 1,541 acres, and the 1979 production was about 54.7 million pounds from 2,782 acres. (Fisher, 1975)

Eastern Ontario cauliflower production from 1975 to 1979 is shown in the table below:

	Acres	Marketed Production '000 lbs	Av.Yield/Acre '000 lbs
1975	53	589	11.1
1976	55	707	12.9
1977	56	778	13.9
1978	49	599	12.2
1979	112	1,268	11.3

SOURCE: OMAF[a], 1975-1979

The largest producing area in Eastern Ontario is Ottawa/Carleton where the area increased from 37 acres in 1976 to 52 acres in 1979.

Imports of fresh cauliflower into the Province of Ontario for the period 1977-1979 were:

	Quantity '000 lb	Value $'000
1977	7,549	1,695
1978	4,606	1,270
1979	8,755	2,493

SOURCE: OMAF[b], 1979

Canadian per capita consumption trends of fresh and frozen cauliflower have been as follows:

	Fresh	Frozen	Total
		- pounds -	
1961	2.12	-	2.12
1966	1.60	-	1.60
1971	1.80	0.17	1.97
1976	2.46	0.14	2.60

SOURCE: Hassan, 1979

Applying the Canadian per capita consumption level of 1976 to the Eastern Ontario population of 1979 indicates that the market potential for cauliflower that year was in the order of 2.5 million pounds. Using the same per capita levels and applying them to the projected Eastern Ontario population, the following pattern of consumption and anticipated increases is apparent:

	Fresh	Frozen	Total	Potential Production Acreage (Total)
		- '000 lbs -		
1981	2,952	168	3,120	242
1986	3,070	175	3,245	252
1991	3,164	180	3,345	259
1996	3,223	183	3,407	264

This pattern of population growth and cauliflower consumption indicates that the market potential will increase at the rate of 19,000 pounds per year. This is equivalent to 1.5 acres of new cauliflower production each year.

Some indication of the current sources of supply for fresh cauliflower for Eastern Ontario can be seen from monthly unloadings in Ottawa for the wholesale trade in 1979 (below).

1979 Unloadings of Fresh Cauliflower for the Ottawa Wholesale Trade

	Ontario	Québec	California	Florida	Total
Jan.	-	-	134	10	144
Feb.	-	-	19	11	30
March	-	-	119	2	121
April	-	-	95	-	95
May	-	-	125	-	125
June	11	3	73	-	87
July	132	177	-	-	309
Aug.	228	208	-	-	436
Sept.	81	213	-	-	294
Oct.	105	248	7	-	360
Nov.	11	2	52	13	78
Dec.	-	-	151	-	151
Total					
'79	568	851	775	36	2,230
'78	633	477	330	134	1,574
'77	193	515	781	16	1,505

SOURCE: Agriculture Canada, 1979

Looking at the proportion of the fresh market supplied by Ontario growers in 1979, the percentages were:

June	12 percent
July	43 percent
Aug.	52 percent
Sept.	28 percent
Oct.	29 percent
Nov.	14 percent
TOTAL	25.5 percent

If this distribution is applied for the entire fresh market in Eastern

Ontario, then 75 percent of 2.5 million pounds or some 1,893,000 pounds were imported from elsewhere. This represents about 146 acres of cauliflower production, using the 1976 average yield of 12,900 pounds per acre.

4.5.10 Sweet Corn

Sweet corn is a major commercial vegetable crop in Ontario. In 1979 it was grown on 44,240 acres, with a farm value of $14.2 million. Corn for the fresh market accounted for 16 percent of the acreage and about 26 percent of the farm value. The bulk of the crop goes for processing. No sweet corn is grown for processing east of Kingston.

The production of sweet corn in Ontario for the fresh market ranged between 5,700 and 6,100 acres between 1975 and 1979 and output ranged from about 4,700 thousand dozen to almost 5,300 thousand dozen.

	Acres	'000 Doz.	$'000 Farm Value
1975	5,790	5,091	3,019
1976	5,722	5,098	3,429
1977	6,116	5,263	3,356
1978	5,680	4,681	3,438
1979	6,040	5,004	3,700

SOURCE: OMAF[a], 1975-1979

Eastern Ontario production has differed from the provincial pattern in that the acreage increased each year over the same period with the exception of 1978 when acreage decreased slightly but yields increased substantially over 1977.

	Acres	'000 Doz.	$'000 Farm Value
1975	788	453	257.2
1976	878	433	276.3
1977	1,048	493	272.0
1978	1,012	627	411.3
1979	1,300	771	589.5

SOURCE: OMAF[a], 1975-1979

Yields per acre vary widely across the province, with the top yields being 1,300 - 1,400 dozen per acre in Southern Ontario. In Eastern Ontario, the highest yields are in the 600 dozen per acre range, however, this is offset to some extent by higher farm prices than in Southern Ontario.

Comparing acreages between 1976 and 1979 for the 8 counties around the South Nation River Basin, all counties showed increases, except Russell. The total acreage rose from 655 in 1976 to 1,015 acres in 1977. (OMAF[a], 1975-1979) The largest increase was in Ottawa/Carleton from 250 to 460 acres. Dundas acreage increased from 62 to 110 and Leeds increased from 72 to 125 acres.

Canadian per capita consumption of sweet corn dropped about 3 pounds over the 10 year period from 1966 to 1976. The decrease was mainly due to a lower consumption of canned corn, while fresh corn seems to have been increasing, particularly in Ontario where per capita consumption is probably higher than the Canadian average.

	Fresh	Canned	Frozen	Total
1966	4.26 lbs	13.17 lbs	2.73 lbs	20.12 lbs
1971	3.63 lbs	11.61 lbs	2.63 lbs	17.87 lbs
1976	5.44 lbs	10.01 lbs	1.70 lbs	17.15 lbs

SOURCE: Hassan, 1979

Applying the per capita consumption levels to the Eastern Ontario population showed the following market potential for 1976 and 1979:

	Fresh '000 lbs	Canned '000 lbs	Frozen '000 lbs	Total '000 lbs
1976	5,376 (896,000 dz)	9,892	1,680	16,948
1979	5,581 (930,000 dz)	10,260	1,743	17,579

SOURCE: Hassan, 1979

The same methodology applied to projected population growth in Eastern Ontario, shows the following pattern of market potential for sweet corn:

	Fresh	Canned	Frozen	Total
		- '000 lbs. -		
1981	6,529	12,013	2,040	20,584
1986	6,790	12,493	2,122	21,405
1991	6,998	12,877	2,187	22,061
1996	7,128	13,115	2,227	22,471

On the basis of 6 pounds per dozen for fresh market, the potential is:

1981	1,088,102 doz.
1986	1,131,593 doz.
1991	1,166,308 doz.
1996	1,187,945 doz.
Average yearly increase	6,656 doz.

The 1976 and 1979 figures for Eastern Ontario production and consumption market indicate:

	Production	Consumption	Percent
	- dozen -		
1976	433,000	896,000	48
1979	771,000	929,000	83

that Eastern Ontario production is supplying an increasing percentage of the consumption potential. If this trend is carried on with future production, it can be assumed that the majority of the 1981-1996 consumption potential could be filled by local Eastern Ontario production. This would indicate that, using yields of 800 dozen per acre that production acreages could be:

	Fresh Production	Fresh Acreage
	('000 dz.)	
1981	1,088	1,360
1986	1,131	1,414
1991	1,166	1,458
1996	1,187	1,484

This illustrates that acreage increases would be in the order of 8.3 acres per year.

Imports of fresh corn into Ontario over the 1977-1979 period held relatively steady around the 15 million pound level:

	Quantity '000 lb	Value $'000
1977	14,810	1,447
1978	15,115	1,661
1979	14,986	1,863

SOURCE: OMAF[b], 1979

Origins of imported fresh corn can be seen from unloadings for the Ottawa wholesale trade in the table below.

1979 Unloadings of Fresh Corn for the Ottawa Wholesale Trade

	Ontario	Québec	Florida	Other US	TOTAL
Jan.			67		67
Feb.			22		22
March			84		84
April			215		215
May			680		680
June			649	21	670
July	65	292	30	198	585
Aug.	7	1,744			1,751
Sept.	11	363			374
Oct.	24	56	9		89
Nov.			65		65
Dec.			28		28
Total					
'79	107	2,455	1,849	219	4,630
'78	326	2,011	1,770	71	4,178
'77	706	1,396	1,459	357	3,918

SOURCE: Agriculture Canada, 1979

In 1979 Ontario growers had 18 percent of the Ottawa wholesale unloadings. Their share fell to 8 percent in 1978 and again to 2 percent in 1979. Over the same period, the share to Québec growers rose from 36 percent of that market in 1977 to 53 percent in 1979.

The monthly percentage market share for the July-October period in 1979 shows the dominance of Québec corn in the Ottawa market during the local growing season. The low market share for Ontario growers, coupled with the increasing sweet corn acreage in Eastern Ontario suggests

	Ontario	Québec	U.S.	Total
		- percent -		
July	11	61	39	100*
Aug.	less than 1	99	-	100*
Sept.	3	97	-	100
Oct.	27	63	10	100

*Figures do not add correctly because of rounding.

that local growers are finding it more profitable to market through roadside stands, farmer markets and pick-your-own. The July-October unloadings in 1979 to Ottawa wholesalers amounted to 2.8 million pounds, of which 107,000 pounds or 4 percent was grown in Ontario. The remaining 2.7 million pounds represents a potential 560 acres of production, much of which could be grown locally in the Basin for the wholesale trade.

4.5.11 Tomatoes

Tomatoes are Ontario's largest commercial vegetable crop in terms of farm value. It exceeded $59 million in 1979. Tomatoes for processing were valued at $39.3 million, greenhouse tomatoes at $12.4 million and fresh market tomatoes at nearly $7.4 million. The processing acreage was 39,800 and the fresh market acreage was 17,100.

Eastern Ontario tomato production is confined to the fresh market, and it is relatively small:

	Acreage	Ave.Yield/Acre '000 lbs	Marketed Production '000 lbs.
1975	144	26.0	3,742
1976	145	19.0	2,761
1977	131	16.2	2,128
1978	124	12.9	1,605
1979	145	11.9	1,721

There is no apparent reason for the continuing drop in production per acre from 1975 through 1979, other than area weather conditions. Average yield for the period was 17,800 pounds per acre.

Of the counties that are part of the Basin, Ottawa/Carleton had more than one-third of the acreage (52 acres) in 1979. The next largest producing county was Glengarry with 12 acres. Production in the remaining counties is in the 5-10 acre range.

Canadian per capita consumption of fresh tomatoes dropped slightly between 1966 and 1976, while consumption of processed tomatoes in the form of juice and ketchup increased. Canned tomato consumption remained constant over that period.

	Fresh	Canned	Juice	Ketchup	Total
1966	12.94	10.33	11.42	10.20	44.89
1971	11.19	10.11	9.32	10.83	41.45
1976	11.81	10.31	12.42	12.74	47.28

The commercial acreage of fresh market tomatoes in Eastern Ontario in 1979 was 145 acres that produced 1.72 million pounds. If production had been at the 1979 optimum level to meet market potential, Eastern Ontario would have produced 12.1 million pounds, requiring an additional 551 acres (based on a five-year average yield of 17,400 pounds per acre) or a total of 696 acres.

The pattern of the future market potential for fresh tomatoes in Eastern Ontario from 1981 to 1996 shown in the table below, using 1976 per capita consumption levels:

	Fresh '000 lbs.	Potential Production Acreage (Fresh)
1981	14,177	815
1986	14,739	847
1991	15,192	873
1996	15,474	889

Unloadings of fresh tomatoes in the Ottawa wholesale market totalled 10.9 million pounds, down from 11.6 million pounds in 1978. The 1977 unloadings 8.7 million, about 2.3 million less than 1979. Unloadings by month are shown in the table below.

1979 Unloadings of Fresh Tomatoes for the Ottawa Wholesale Trade

'000 lbs.

	Ont	Qué	Virginia	Calif.	Florida	Other US	Mexico	Total
Jan.					586	296	175	1057
Feb.					323		639	962
Mar.					425		478	903
Apr.					600	57	197	854
May					989			989
June					936	169		1105
July	43		178	269	4	480		974
Aug.	855	159	38	248		132		1432
Sept.	215	80		201		98		594
Oct.	4			550	62	60		676
Nov.					619	33		652
Dec.					732			732
Total								
'79	1117	239	216	1268	5276	1325	1489	10,930
'78	991	274	-	2214	3321	2297	2526	11,623
'77	745	280	-	1712	3140	799	2005	8,681

The market shares of the Ottawa wholesale trade in 1979 were:

Ontario	10 percent
Québec	2 percent
Virginia	2 percent
California	12 percent
Florida	48 percent
Other U.S.	12 percent
Mexico	14 percent

Florida was the major fresh tomato supplier with 48 percent of the market, up by nearly 2 million pounds over 1978, at the expense of California, other U.S. States and Mexico. The Ontario share of this market increased from 745,000 pounds in 1977 to 1,177,000 pounds in 1979.

The July-September portion of the Ottawa wholesale trade recorded unloadings of 3 million pounds in 1979, of which Ontario growers supplied 37 percent. The remaining 63 percent represents approximately an additional 109 acres of potential production, some of which could be supplied by local growers.

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5. Other Crops, Products and Livestock

5.1 Flowers, Potted Plants, and Nurseries

The flower and potted plant industry in Eastern Ontario differs greatly from other agricultural crops and commodities. Since the demand for the floral products is based on social rather than physical needs, it is possible than any given area can have a huge potential or no potential for increasing sales. Generally the large urbanized centers experience a much larger demand than do the rural areas. This appears to be the case in the Basin area. For example, there are as many as 60 outlets in Ottawa and fewer than 10 in the rural areas of the Basin. The same trend appears to exist with the location of nursery operations.

Although there are several flower and plant products operations in and around the Basin, the industry as a whole is limited in both present extent and future potential.

Flower and potted plant production is predominantly a family operated seasonal operation. Greenhouse construction costs, escalating energy prices and imports of flowers and plants from warmer environments have discouraged further development of local area production.

There is an extensive development of nursery stock production in and adjacent to the Basin, particularly in Ottawa/Carleton and Grenville County (see table below). Most of these nursery products are sold directly or through small contractors into the Ottawa market. Some of the largest acreages of nursery products are owned and operated by federal and provincial government agencies.

Nursery Products 1976

	# Farms	Area ac.
Dundas	0	-
Glengarry	3	17
Grenville	8	128
Leeds	1	1
Ottawa/Carleton	21	787
Prescott	1	1
Russell	1	1
Stormont	0	-
Total	35	937

5.2 Greenhouses and Mushroom Farms

The 1976 Census did not separate greenhouses and mushroom farms so it is not possible to estimate the area in square feet allocated to these forms of production in the Basin counties. The Census data indicates that there were 83 operators with nearly 600,000 square feet of producing area in 1976 in the Basin counties. The table below indicates that most of the operations are small scale. More than 60% of the total producing area for greenhouses and mushroom farms is in Ottawa/Carleton. Fine's Flowers have the largest greenhouse area in flower production and Continental Mushrooms dominate the mushroom business. There are no large scale greenhouse vegetable operations in the area.

Greenhouses & Mushrooms - 1976

	# Farms	Area in sq.ft.
Dundas	1	3,056
Glengarry	6	18,482
Grenville	7	10,688
Leeds	11	85,788
Ottawa/Carleton	42	367,470
Prescott	9	88,085
Russell	4	7,988
Stormont	3	18,000
Total	83	599,557

We believe that many of the existing greenhouses are used as cold frames to grow vegetable and flower seedlings, and potted plants. Escalating energy costs for greenhouse heating have made it unattractive for year round operation in Eastern Ontario - even for the production of cut flowers. Since greenhouse vegetable production is less profitable than flowers even in Southern Ontario, it is unlikely that the current pattern of operation will change in the foreseeable future.

In a previous study we estimated that the economic size of a greenhouse for vegetable production was about 160,000 sq. ft. and that this scale of operation would only be profitable if it produced tomatoes (or flowers). More recently a number of very small greenhouses have been built incorporating such features as hydroponic techniques and passive solar heating. They are in the order of 4,000 sq. ft. in size and operate as an adjunct to other farm operations, utilizing surplus labour.

Until production systems are available and/or there are further increases in the price of winter vegetables, it is unlikely that there will be any new investment in the greenhouse industry without substantial government assistance.

There have been recent substantial changes in the scale of mushroom production and marketing in Eastern Canada. Small producing units are giving way to large corporate operations, the most recent of which began producing in the past year near Montreal. It is a laboratory-like environment costing in the order of $10 million.

5.3 Sod Farms

The FARINEO land use study indicated that there were 2,547 acres of sod being produced in Basin townships in 1979-80. About 60% of the production was in Osgoode and Gloucester townships:

Townships	Sod Farm Acreage
Osgoode	1061
Gloucester	527
Alfred	491
Edwardsburgh	269
Matilda	196
Total	2547

Since the largest part of the sod market is for new residential, commercial, and industrial construction, we do not expect any substantial increases in sod production in the foreseeable future. Much of the existing irrigation equipment in the area is used on sod farms as well so that no major increases are expected in water use in this regard.

5.4 Maple Products

The production of maple sugar and syrup in the Basin is relatively small when compared to other agricultural commodities, however it does represent a significant proportion of the total Ontario production. All of Eastern Ontario is estimated to account for approximately 50% of the Ontario production. It is therefore possible that the Basin could contribute 20-30% of this production. The actual figures for the Ontario production and the estimated Basin production are included in Table

	Ontario Production			Estimate Basin (25% of Ontario)	
Year	Syrup gal.	Sugar gal.	Farm Value $	Syrup & Sugar gal.	Value $
1979	179,000	18,000	3,004,000	183,500	751,000
1978	143,000	12,000	2,170,000	38,750	542,500
1977	146,000	9,000	2,080,000	38,750	520,000
1976	133,000	14,000	1,774,000	36,750	443,500
1971	148,000	15,000	1,078,000	40,750	269,500

The comparatively low interest in maple products appears to be due to the poor economics of production and the degree of specialization needed for large commercial enterprises. A 1978 study (Framst, 1979) indicated that when an average production of 5.6 taps per gallon is obtained the costs and returns in Eastern Ontario are as follows:

Gross Income	16.68 $/gal.
Variable Costs	6.41
Gross Margin	10.27
Fixed Costs	9.97
Total Costs	16.38
Return	.30

The study however also indicated that experience and advanced technology applied to operation can raise the returns to \$2.00 to \$4.00 / gallon.

As with many other agricultural enterprises, the scale of maple operations varies greatly. The average Eastern Ontario large commercial maple farm has 1,400 trees tapped per farm, whereas the small hobby farm may have from one to a few hundred trees tapped. These small operations however seldom sell their product on the retail market.

5.5 Honey

The honey industry in the South Nation Basin is very restricted. There are at present only 3 major producers of honey and in total relatively few beekeepers. The small size of the industry can be attributed to two factors; poor market and poor beekeeping conditions. The area market is relatively small and is easily handled by the large producers and by imported honey, and this restricts the numbers and scale of local area production. The second restricting factor, poor beekeeping conditions, is a result of the increased area of cash cropping and the decrease of pasture land and forage crops needed for bee production.

5.6 Horses and Goats

Although the exact number of horses and goats within the Basin is not readily available, it is known that numerous farms have a small number of horses and/or goats, and there are also a few relatively large herds of goats. The horse population is generally associated with the small hobby farms which can have anywhere from 1 to 30 horses. There are also a few large livestock farms which keep 1 or 2 horses for riding or working purposes. In general, the largest number of horses are kept for pleasure riding and are within the more urbanized townships. In other regions of Ontario it has been found that numerous large equestrian farms in an area tend to affect the general economy of the region, in the Basin, however, the farms are not large enough to have this effect and thus do not merit great concern in overall agricultural planning.

Similar to the horse population, the goats are generally associated with small hobby farm type operations. In these circumstances, a small herd of 1 - 5 goats are kept for on-farm use of the milk or meat produced. Although the animals can contribute to the self-sufficiency of the individual farms they have little, if any, affect on the overall farm community. On the other hand, the few large herds in and around the Basin are significant agricultural enterprises. Again, however, since there are only 2 - 5 such farms, they have little impact, at present, on the agricultural systems within the Basin. It is possible that in the future the popularity of goats for milk, cheese, and/or meat could encourage expansion of the small operations to a more commercial scale. One example of such a farm, presently producing goats milk from a herd of 300, is located northeast of the Basin. It appears that a trend toward this kind of goat production could be possible for a relatively few number of producers within the Basin.

5.7 Rabbits

A number of part time and hobby farmers raise meat rabbits for sale in the Ottawa area. There are probably 8-10 retail outlets that handle rabbit meat as a speciality item. One small slaughtering plant west of the Basin handles most of the trade. Larger numbers of rabbits for slaughter have to be trucked to Newcastle or the Montréal area.

Producers believe that there is a substantial underdeveloped market potential for rabbit meat; however, realization of the potential requires market analysis and development planning.

5.8 Other Specialty Crops

There are many horticultural and field crops that can be grown in the Basin area in limited quantities for special markets. There speciality crops each have their own specific requirements for production and marketing. They may require special equipement, handling, packing, storage and delivery arrangements. The grower must become a specialist with that particular crop, including the marketing. In fact the ability of the grower to work back from highly specific market requirements through his own production, handling and delivery system is what creates a successful speciality crop enterprise.

In general many of the horticultural crops fit this description of specialty crops because they are not widely grown commercially in the Basin area. Others that could be considered by aggresive, market-oriented specialty growers are fresh vegetables such as Chinese cabbage, bok toy, Jerusalem artichokes, and a variety of herb crops. Among the specialty field crops are brown mustard, sunflowers, vegetable soya beans, natto beans, as well as white beans and several other bean varieties. Seed production is another type of specialty crop production.

One of the major problems associated with the production of specialty crops in Eastern Ontario is the lack of good information about crop production and management. While KCAT and the Ottawa Research Station often have research plots of specialty crops, there is not demonstration-type facility where interested growers can visit field-scale operations and obtain estimates of production costs, yields, and other management information appropriate to Eastern Ontario.

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AGRICULTURAL COMPONENT BACKGROUND STUDY

PART II

Prepared for the South Nation River
Conservation Authority, Berwick, Ontario

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in co-operation with
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agriculture - natural resources - economic development - research

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CHAPTER I

SUMMARY OF
AGRICULTURAL PRODUCTION OPPORTUNITIES & CONSTRAINTS

The data and information describing the agriculture industry in the Basin was assembled and analysed in Part One of this Study. Part Two is concerned with interpreting and inter-relating those facts and figures in the context of long term agricultural development and water resource managememt planning.

Changes in the structure and patterns of activity in the agricultural industry indicate that the industry is a dynamic one. Many adjustments have been made and the process is continuing. The number of commercial farms is decreasing and they are becoming larger. Investment in buildings, equipment and facilities is increasing. A similar pattern is occuring in the food and beverage manufacturing and processing sector.

The direction of agricultural development in the Basin and surrounding area is toward improvement and strenghtening of the dairy business, and expansion of cash crop production. Increased tile drainage has been a major positive factor in both cases. There is some limited potential for expansion of horticultural and specialty crops; however, substantial investments will be required in buildings, equipment and facilities in response to specific market opportunities.

Institutional arrangements will continue to hold back growth of dairy and egg industries. At the same time existing operators may expand their individual enterprises by purchasing more quota. Beef and hog enterprises are currently suffering from a serious cost/price squeeze which will ultimiately lead to fewer producers. The likely long term response will be for livestock producers to diversify their operations to reduce their dependence on hogs and beef. Rapidly rising interest rates and other costs may force more producers to accept vertical integration with agribusiness in order to maintain their operations. Other operators will simply sell out or switch to cash crops if they can afford to do so.

The process for examining the agricultural development options and the water resource management implications involve two steps:

- identify and summarize the agricultural production opportunities and constraints
- prepare conclusions and recommendations.

A third step has been carried out in a separate report where we utilized a modelling exercise to compare different agricultural land use alternatives.

In the analysis of the production and market data, and from discussions with producers, trade people and other specialists, it became evident that there are a number of opportunities to expand agricultural production in the Basin. Also, the production and marketing of local commodities are governed by one or more constraints of various kinds. The following work summarizes the major opportunities for the different groups. It outlines a list of needs that underlie and thrust agricultural development in the Basin.

We have prepared a matrix to show the relationships between commodities, the development of opportunities, and the major types of governing constraints. The matrix does not include every possible opportunity or constraint. It includes those that appear to have general application in the Basin and adjacent areas.

Production and marketing of most commodities are governed by a number of constraints. This does not mean that new opportunities must await removal or amelioration of all the constraints involved. The general nature of the opportunities are identified and the related needs or action are outlined toward removing or offsetting the constraint(s) concerned.

Some of the opportunities have a higher likelihood of being realized than others because of the availability of markets and the low levels of investment required on the part of producers. Others may not prove to be feasible until conditions change in the national or provincial economy, or until there is some specific policy change.

Figure 2.1 Summary of Opportunities and Constraints

CONSTRAINTS

COMMODITIES	RESOURCE BASE			MANAGEMENT			FINANCIAL				MARKETING			FACILITIES			INSTITUTIONAL				OPPORTUNITIES	TYPE OF NEED TO REALIZE OPPORTUNITY
	weather/climatic limitations	drainage problems, poor soil conditions	water quantity/quality	high degree of specialization req'd	poor quality control	availability of farm labour	high capital cost	high interest rates, operating costs	high risk	low farm income	limited local market	access to external markets	market structure	handling/packing	processing/manufact.	storage/delivery	quotas	government policies	competion for land	other		
Livestock			X																			
Dairy				X		X	X	X									X				. more industrial milk to larger processors	
Beef							X	X	X	X					X						. dairy beef, backgrounding steers & heifers	. local slaughtering & processing facility
Veal				X					X						X						. heavy red veal to Québec market, white veal for Ontario market	
Hogs						X	X	X	X	X					X						. feeding out weaners	
Sheep/lambs															X						. increased lamb production for growing market	
Eggs & Poultry				X		X	X	X							X		X				. opportunities limited	. local slaughtering & processing facility
Field Crops		X																	X		. rehabilitate unused agricultural land, improve lower quality soils	. increased tile drainage
Corn				X			X	X								X					. industrial processing for starch, oil, fructose, alcohol, foods, and feed	. collection, handling & grading systems
Soybeans														X		X					. oil & meal production for local & export markets	. collection, handling, storage & delivery system, and crushing facility
Other oilseeds														X		X					. oil & meal production for local & export markets	
Barley										X											. opportunities limited	
Wheat																				X	. opportunities limited	
Alfalfa										X											. alfalfa pellets & meal, export of high quality hay	. dehydrating plant, new crop varieties
Fruit & Vegetables	X			X	X	X	X	X	X		X	X	X	X	X						. Ottawa fresh wholesale market, fresh exports	. market development, new facilities & equipment
Other Specialty Crops	X			X	X	X	X	X	X		X			X						X	. local & export markets	. market development, new facilities & equipment
Agricultural Industry			X				X	X			X							X			. commodity handling, processing & related manufacturing	

CHAPTER II

CONCLUSIONS & RECOMMENDATIONS

The final section of this study looks at the opportunities and constraints on agriculture in the Basin, and attempts to spell out a series of conclusions and recommendations that fit within the reality of area markets, and the production system in the Basin. The conclusions and recommendations are presented on these different levels. The first deals with the individual commodities and the development potential for these commodities. The second level deals with rural economic development needs in support of current and anticipated commodity development. The last part of the section outlines the land and water management needs and implications in the Basin that are to be addressed now and in the future to enhance agricultural development and to ensure that the land and water resources are managed effectively and efficiently.

There is no planning framework for Eastern Ontario agriculture within which to fit the findings of a development oriented program for agriculture in the South Nation River Basin. As a consequence other studies are needed to provide essential information for development planning and resource management. There are specific problems to be addressed, as well as the need to provide more and better analytical information about markets, investment opportunities and management alternatives. Appendix C lists some of the additional work that needs to be done in the context of agricultural development and resource management in the Basin.

2.1 COMMODITY DEVELOPMENT

The inherent capability of the resource base and the available production systems enable a wide range of different agricultural commodities to be produced in the Basin. Basically the problems are not a lack of ability to produce a given commodity that is adapted to Eastern Ontario, but rather to be able to produce and market that commodity profitably on a continuing basis. The problems take several forms - ranging from institutional constraints on the number of producers and the amount of production, economic disadvantage compared to another producing area, or lack of specialized experience and investment in a particular crop.

We have examined the major commodities currently being produced in the Basin, as well as others that appear to have commercial potential for development. Several commodities, particularly among the horticultural crops, can be grown in the Basin; however, given the scale of production elsewhere there is little likelihood of being able to produce and market them profitably in the Basin in the foreseeable future.

Although Part I of this report does not directly address the feasability of utilizing nontraditional feeds, such as liquid whey for hogs or food and food processing wastes for dairy and beef cattle, there is on-going government research on this topic. Liquid whey is successfully used in commercial hog feeding operations at present, and food processing wastes are used extensively for both hogs and beef feed. It is recommended that specific information required in this regard should be sought from the researchers involved or through OMAF Extension Service.

2.1.1 Dairy

The production of milk is the single most important agricultural activity in the Basin. In 1976, almost three-quarters of all farmers with sales of over $2500 received the major share of their income from the production of milk. The 1,341 farmers in the Basin that were registered with the Ontario Milk Marketing Board in 1980 sold a total of nearly 260 million litres in that year. Average sales per farm were 193,000 litres, compared with 184,000 litres per farm in Southern Ontario.

Dairy farming will continue to be the major form of agricultural enterprise in the Basin. The trend to fewer and larger dairy farms is expected to continue as those with smaller herds retire or leave the industry. While the average size of operation and the volume of milk production per farm will increase through this consolidation process, the rate at which the changes occur will be governed by the availability of family labour and by the operator's ability to manage outside labour and financial resources.

Rationalization of the industry could be accelerated if alternate opportunities could be identified for those who may wish to leave the business.

Since quota is presently being purchased elsewhere and moved into the Basin, we can expect a net growth in production over the long term. Additional opportunities rest mainly with finding better ways to utilize surplus calves, and to produce cash crops that compliment the existing operations in the utilization of labour and equipment.

2.1.2 Beef

Total demand for beef in the Ottawa-Hull area in 1976 was estimated to be 148.9 million pounds. Only about 46.3 million pounds were slaughtered locally. Veal demand was estimated at some 6.6 million pounds and only about one-eighth was slaughtered locally.

The production of beef has traditionally not been important in the Basin, compared with dairy farming. Estimates for 1980 indicate that there were about 15,500 beef cows on Basin farms. Many of the beef producers have other farm enterprises, or have off-farm jobs.

At the present time beef production is economically unattractive. In the longer term beef appears to be the only livestock enterprise capable of absorbing the number of farmers who are likely to leave the dairy industry. In the long term we anticipate that beef cows will be kept mainly as scavengers on cash crop farms, or on farms operated by part-time farmers.

Beef feed-lots were not examined in detail in this study because of their relative unimportance across the Basin. There may be some limited opportunity for future expansion in this area because of available silage and grain corn. There appears to be a locational disadvantage for feed-lot operators because of the lack of a major slaughtering facility in Eastern Ontario.

The potential increase in income from the sale of dairy calves as vealers, feeders or finished beef is substantial. The utilization of these calves as dairy-beef is presently not occurring because of tradition, a ready market for bob calves in Montreal and the relative profitability of milk production. Given the greater returns from producing milk rather than veal or beef, there is only limited incentive for change. The production of heavy veal and finished dairy beef will probably increase as the number of dairy farms decreases and former dairy producers seek alternative production opportunities. It is also anticipated that a small number of dairy farmers will add a veal or finishing enterprise to utilize labour, buildings, and/or farm produced grain and forage.

We suggest that dairy beef and veal production be encouraged as a secondary profit center or a small scale independent operation, and that larger scale beef feed-lots not be encouraged to develop until such a time that financial and logistic conditions improve to a level capable of supporting these specialized operations. Improved long term financing arrangements are needed.

2.1.3 Hogs

In 1976 only about 6% of 71.6 million pounds of pork consumed in the Ottawa area went through local slaughter houses. The majority of the finished hogs are shipped to Toronto for slaughter.

Hog numbers in the Basin have fluctuated widely since 1971, from a low of 24,000 in 1976 to a high of 43,000 in 1980. Weaner enterprises and farrow to finish enterprises are the most common. Many of the weaner pigs are sold to Québec farmers for finishing, with Ontario corn following the pigs to Québec. We believe that about 100,000 weaners leave the Basin to be finished elsewhere in Ontario and Québec. Three-quarters of the Basin area hog farms sold 50 or less hogs in 1979, and only 8% sold more than 500 hogs, compared with 53% and 10% across the Province. While the number of sows decreased in Ontario by 2.4% from July 1, 1979 to July 1, 1980, the number in the Basin increased by 5.7%.

The characteristics of hog production suggest that they are a secondary enterprise on many farms in the Basin, and that numbers will continue to fluctuate with pork prices and feed supplies.

The present structure of the industry is inefficient from an agricultural development point of view because of the export of a substantial number of weaner pigs to Québec and elsewhere in Ontario. The export of weaners to Québec occurs because of the combination of the Québec hog stabilization subsidy and feed freight assistance. Eastern Ontario is deficient in pork and there is the potential for substantial production. However it is recommended that hog production not be expanded until the cost/price balance is restored and a local slaughtering facility is made available. With good management, the long term outlook for hog production is a profitable one.

2.1.4 Sheep

There are a small group of dedicated sheep and lamb producers in the Basin. The trend has been to a few large commercial flocks, and an increasing number of small flocks on hobby or part-time farms. In 1971, 45 farms reported 2,171 sheep and in 1976, 83 farms reported 4,646 animals. Much of the lamb produced in the area is sold locally for the fresh market and freezer trade. This trend is expected to continue, reinforced by the changing ethnic mix in our population where many people have strong preferences for lamb and mutton. As pork and beef prices rise many consumers will look for alternatives and lamb is one logical choice.

The ability of sheep and lambs to thrive on good quality forage and cereals such as oats could well be an important factor in keeping future costs very competitive with beef, pork and poultry meats.

It is recommended that small flocks be expanded to commercial scale and that hobby or part-time farmers be encouraged to enter sheep and lamb production instead of dairy, beef or hog production. In order to optimize the potential for sheep and lamb it is recommended that they be promoted as alternative meats in markets other than local-fresh.

2.1.5 Goats & Rabbits

There is potential for continued growth in terms of both the number of producers and of animals. They are not likely to be a major source of income to a large number of producers, however, they represent excellent part-time farm enterprises. The general recommendation for sheep and lamb would also be applicable to goat and rabbit production.

2.1.6 Eggs & Poultry

From 1971 to 1976 there was a reduction in the number of farms with poultry and a 17% reduction in both the number of farms with laying hens and the number of hens. In 1976 about 96% of the hens and chickens were on 62 farms and 97% of the laying hens were on 59 farms.
The production and marketing of eggs is controlled by quota.
The average commercial egg producer had a quota of 11,690 hens and since farmers are presently allowed to have approximately 70% of their quota, the average flock is about 8,200 birds.

The egg and meat industries are of limited size and importance. We see no opportunity for net growth because quotas must be sold together with buildings. There is opportunity for internal consolidation which will occur as large operators buy out smaller ones. This will have little benefit to the rest of the economy.

The poultry meat industry in the Basin is very small because there is no slaughtering facility. Currently birds have to be trucked to Aurora or Kitchener. There is not likely to be such a facility established in Eastern Ontario under the current supply management system. Other poultry such as ducks and geese will continue to be raised as a hobby or small sideline operation.

2.1.7 Corn

Ontario produced nearly 4.3 million tonnes of grain corn in 1979, or 87% of the Canadian total. The province is a net exporter of corn, having shipped out some 806,700 tonnes over the 1979-80 year. An annual average of about 140,000 tonnes is estimated to move from Eastern Ontario to Québec for feed. Feed manufacturing utilized about 740,000 tonnes in Ontario, and nearly 2.0 million tonnes was consumed as on-farm feed. Industrial processing utilized nearly 852,000 tonnes. At the same time, Ontario imported some 425,000 tonnes of American corn.

From 1971 to 1976 the acreage of grain corn in the Basin was about 37,000 acres. Since then it has increased to nearly 50,000 acres which is equivalent to about 100,000 tonnes annually. Silage corn acreage is approximately 40,000 acres.

We anticipate a continued increase in the total acreage of corn as farmers reduce acreages of hay and oats, and more land is tile drained. Silage corn acreage is directly determined by the number of dairy and beef cows and cattle on feed. While the acreage of silage corn is likely to remain fairly stable for some time, there is a trend away from silage to high moisture grain corn, and to other protein sources that are less costly to produce on a per acre basis.

Grain corn has an excellent potential for expansion as a cash crop, as well as for on-farm feed. Markets include the feed trade in Eastern Ontario and Québec, and as an industrial crop

Dairy and livestock farmers will continue to grow corn as a source of on-farm feed and for cash sale. Specialized industrial markets exist for grain corn that will become increasingly attractive to growers because of the premium prices that are paid over the No. 2 corn price. These markets include corn oil and starch, fructose sugar, breakfast foods, and beverage alcohol.

The expansion of the industrial market could be of great importance to local corn growers. For example, Canada Starch Company is increasing its capacity from 40,000 to 50,000 bushels per day and they are also building a new plant at Port Colbourne to produce fructose sugar. A similar large scale plant is now in operation in the London area.

Production for these markets requires a committment to the specific market in terms of growing a suitable high quality product and installation of appropriate handling facilities, or to have access to properly equipped collection stations. The specific requirements of each of these markets needs to be identified, as well as the requirements for supporting facilities, so that interested growers can assess the profit potential for their own situation.

2.1.8 Soybeans

Soybeans are a promising new cash crop in the Basin. New short season cultivars have been developed at the Ottawa Research Station for Eastern Ontario. These new cultivars yield well in Eastern Ontario and are in demand as high quality crushing beans. Many farmers have been growing small acreages on a test basis and as livestock feed. We expect that the acreage of soybeans as a cash crop will now grow quickly up to 10-15,000 acres in the Basin. This view is based on the current interest being shown in the area by oil seed crushers, commodity brokers and seed companies. (One oil seed crusher is already making arrangements with elevator operators and farmers to expand production for this year.)

Production experience indicates that quality and yields are comparable to, or better than Southern Ontario. Yields are in the order of 30-40 bushels per acre. Soybeans will fit well in crop rotation systems and provide a much-needed alternate cash crop to corn. Production costs are lower than corn and less capital investment is required in equipment. For the crop acreage to expand, a collection and storage system specifically for soybeans is needed, and appropriate marketing arrangements, to ensure that growers will be able to sell high quality beans for the best possible price.

It is recommended that soybean production be promoted among the local farmers and that an assistance program be established to ensure that the resulting production is properly handled and marketed. It is also recommended that the agricultural extension services in the area be geared toward providing the potential growers with useful guidance information.

The development of a soybean cash crop has important implications for dairy farmers and other livestock producers in that there is an opportunity to obtain lower cost soybean oil meal on the back haul from oilseed crushing plants.

The expansion of soybean acreage is dependent on the marketing system that evolves to handle the crop. The current system is not adequate to ensure delivery of a continuous supply of high quality crushing beans.

2.1.9 Other Oil Seeds

Several other oil seeds have potential as future cash crops in the Basin and Eastern Ontario. They are canola (rape), sunflowers, yellow and brown mustard. Economic production of yellow mustard has already been demonstrated in the area. These crops await the development of export markets, or a new crushing facility closer than Windsor.

Additional new markets for oilseed may be developed in the future if they are found to be useable in the production of diesel fuel substitutions or blends.

2.1.10 Cereal Grains

Cereal grains are less lucrative for Eastern Ontario producers than corn or oil seeds. They are an integral part of many rotations and they will continue to be important in this regard, especially where they are used for on-farm feed. The continuing presence of a relatively large acreage of mixed grains (22,000 acres in 1980) in the Basin is an indicator of their importance.

Barley appears to be replacing oats on many farms as a feed and a cash crop and this trend is likely to continue. The acreage has nearly doubled in the Basin in five years from about 5,400 acres to 10,000 acres. Over the same period the oat acreage has decreased from 35,000 to 25,000 acres. Barley is a high energy feed that can be grown successfully on a wide range of soils and different weather conditions. Production cost per acre is also lower than corn, but returns are higher than oats. Some dairy farmers are reported to have ensiled barley with good results.

Wheat acreage in the Basin appears to vary from year to year. Winter wheat may become more attractive as a cash crop in certain farm rotations after soybeans or other oil seeds. Wheat could be a more attractive crop in the future if area growers are given access to more suitable varieties and marketing arrangements are improved for the growers by the marketing board.

2.1.11 Forages

Alfalfa is and will continue to be the major legume crop in the Basin as part of the hay and pasture system. There were about 172,000 acres of tame hay in the Basin in 1980 and much of this acreage contained a high percentage of alfalfa. This acreage is expected to decrease over time as yields improve and cash crops expand. There is increasing interest in pure stands of alfalfa as a major source of low cost protein for dairy and other livestock both in the Basin and elsewhere.

Alfalfa may offer some additional opportunities as a cash crop. There are two possibilities in this regard. Alfalfa is already being exported in baled form for hay and the opportunities for expansion in this area should be explored further. Also, local and export markets for dehydrated alfalfa pellets for feed should be examined. One of the needs in the Basin and adjacent areas is for new alfalfa cultivars that are better adapted to local conditions.

2.1.12 Horticultural Crops

Fruit and vegetable growers in the Basin have a long history of commercial production and marketing of their products. The development of the McIntosh apple is one example. Vegetable production in Cumberland Township is another. More recently the interest of consumers in obtaining farm-fresh produce has led to the development of a new group of producers with pick-your-own operations and roadside stands. At the other extreme are a small number of growers who have successfully tailored their operations to commercial production of potatoes and turnips for the Ottawa wholesale trade.

There were 35 growers whose main source of income was from fruit and vegetable production in 1971. By 1976 the number had risen to 51 growers.

The renewed interest in commercial fruit and vegetable production is at least partly due to the success of pick-your-own and roadside stand operations. There is some potential for additional operations of these kinds in the Basin; however, location and choice of crops will be critical. Interested growers should study the situation very carefully.

This study selected four fruit crops and seven vegetable crops for detailed examination in the context of fresh production for the Eastern Ontario market. The choice of these crops is based on their general suitability for local production, and a continuing strong market for these kinds of commodities. The four fruits were apples, blueberries, raspberries and strawberries. The seven vegetables were asparagus, broccoli, brussels sprouts, cabbage, cauliflower, sweet corn and tomatoes.

All have some potential for expansion as do others; however, a grower has to identify a specific market situation and gear his/her production to meet the requirements of that particular situation, including quantity, handling, packaging, storage, and delivery.

There are substantial opportunites in the Ottawa wholesale trade for import substitution of fresh produce. We have estimated the size and value of this potential to be in the order of 2,700 acres worth $3.8 million annually. This is made up of about 1,450 acres of the seven vegetables and 1,250 acres of the four fruits (mainly apples). While it is unlikely that this level can be achieved, aggressive producers could obtain a considerable share. Gaining a continuing access to this market will require a great deal of work and investment on the part of the growers.

Growers who wish to expand their production of selected commodities for the wholesale trade will have to develop a close working relationship with wholesale buyers. To meet and service this market the growers will have to become specialists in one or more crops and make substantial new investments in facilities and equipment. Government assistance should be provided for the facilities such as pre-cooling, washing, packing, and storage so that the growers can be competitive with imported produce.

Development of the fruit and vegetable production potential in the Basin and in Eastern Ontario requires a broader base than the seasonal fresh market. There is a need for exports of fresh produce to other areas and the ability to store and package top quality produce.

It is recommended that any large scale development of fruit and vegetable production in the Basin and adjacent areas be preceded by a thorough analysis of area export opportunities for large volumes of quality produce, as well as the potential for establishing processing facilities in Eastern Ontario.

2.1.13 Other Crops and Commodities

In Part I of the Agricultural Background Report, several other crops and commodities were reviewed. These included the following:

- Flowers, Potted Plants & Nurseries
- Greenhouses & Mushroom Farms
- Sod Farms
- Maple Products
- Honey
- Horses and Goats
- Rabbits
- Other Specialty Crops

These other crops and commodities are relative small scale, and have little significant impact on the agricultural scenario as a whole, they do fill a very important niche in the agricultural community. In some instances there is potential for growth and expansion and in others opportunities are limited.

The floriculture and sod industry was found to have some continuing potential. Due to the sensitivity of these industries to local market conditions, it is recommended that these operations continue at their own pace and direction in response to their individual markets.

Greenhouses and mushroom farms are other enterprises which show potential. It is recommended that greenhouse operators increase production of horticulture crops marketed in the local fresh market, and possibly the processing market. Mushroom growers should also be encouraged to increase local fresh production; however, emphasis should be placed on examining the potential for development of processing opportunities, such as canning of mushroom sauces, and mushroom-vegetable mixes. In order to achieve these ends, it will be necessary in the long term to develop more efficient greenhouse production and marketing systems, expand the productive area of mushroom houses and develop facilities for vegetable and mushroom processing.

The honey and maple product industries were found to be very limited under the present situation. Problems with both high production costs and limited markets led us to recommend that increased production not be encouraged until a time at which the economics and logistics of production improve substantially. These improvements can only be brought about by research into improved production systems in the case of maple products, and new crop alternatives that are more suitable to honey production.

Other specialty crops, such as sunflowers, natto beans, chinese vegetables, and others were found to have an important place in local agriculture at a very limited scale. There are possibilities that several of these could develop to a point where they become viable export crops (ie. natto beans to Japan). It is therefore recommended that significantly more government and industry support be given to the research and development of specialty crops which show potential.

2.2 LAND AND WATER MANAGEMENT

The productive agricultural land base in the South Nation River Basin has considerable potential for agricultural development without adversely affecting the water resources of the Basin. There appears to be adequate land available at the present time for future expansion of livestock, field cash crops, fruit and vegetables and other specialty crops. The potential for expansion lies in more effective and efficient use of existing cleared land and it can take place without displacing feed sources for dairy cattle. Land drainage can substantially increase the productive capacity of nearly 274,000 acres. Both subsurface (tile) and surface drains are essential to develop this productive capacity.

There are approximately 83,000 acres of idle agricultural land in the Basin. Some of this land needs drainage and some is unsuitable for agriculture. The reasons why this land is not being used for food production are not currently known.

There appears to be adequate land to allow for a tree planting program without being a major deterant to agriculture. The distribution of land between competing uses should be on the basis of economic return, subject to the personal preferences of the land owners.

Flooding has both positive and negative effects. The spring flood does not appear to have a serious economic impact and in fact is seen as a benefit from the point of view of providing nutrients and early thawing of fields. It creates a problem of vehicle access which is especially important to dairy farmers. The June and fall floods cause serious crop damage some years (about one in five).

The extent and degree of water degradation directly due to agricultural use is not known. However most probable sources appear to be associated with waste storage and disposal.

It is recommended that a full scale study be initiated into the waste storage and handling of manures from livestock operations in the Basin to determine leachate losses from storage areas and possible contamination of surface and ground water, and the practices following in waste disposal on the land.

2.2.1 Land Drainage

There were about 78,000 acres of agricultural land tile drained up to mid-1980 in the Basin, and several thousand additional acres that have been surface drained by ditching. Our data indicates that approximately 274,000 acres could benefit from tile drainage in that it would raise the productive capacity of the land above its current level.

While tile drainage without a subsidy does not appear to be economically attractive, many farmers in the Basin have paid the full cost because the subsidy is not always available and because tile drainage substantially reduces the risks in crop production. Because of the importance of tile drainage in enabling farmers to successfully grow more high value crops, much more emphasis should be placed on organizing and coordinating the overall system. Farmers need to have more predictable arrangements for obtaining drainage subsidies and grants, as well as a more efficient way of dealing with the building and maintenance of outlet drains across their farms. Similarily, the Conservation Authority needs comparable information so that it can effectively carry out its water management role in the Basin.

In light of the importance of drainage to the farmers in the Basin and the implication of drainage on water management, we put forward the following recommendations.

a) Prepare a strategy and master plan for surface and subsurface drainage development in the Basin at the township level, taking into account the current water management studies and research work on ditch design:
   - examine existing drainage network to access condition, capacity and capability;

- examine probable new tile and surface drainage requirements;
- identify new or additional requirements and improvements;
- assess environmental impacts, water management implications and agricultural implications, including such problems as drain maintenance and the disposition of ditch spoils;
- review the current system for establishing drainage priorities at the township level to find out if it effectively meets farm needs and how it can be integrated with water management in the drainage basin;
- review the process and methodology by which farmers receive the drainage assistance to determine whether or not changes will be needed to fit the strategy and master plan.

b) Formulate policies to prevent drainage of any unique or sensitive lands, including important ground water recharge or discharge areas that would be damaged by surface or subsurface drainage. Develop a methodology for assessing drainage applications and plans to ensure that:

- important wetlands and recharge areas are not adversely affected by drainage;
- lands that are not sensitive or unique can be drained for agricultural use.

2.2.2 Irrigation

The only data available on irrigation in the Basin are 1971 Census figures. From those we estimated that about 1,800 acres were irrigated at that time, including fruit and vegetable growers and seed farms. We believe that this same pattern continues at the present time.

There does not appear to be any research or field test data available concerning the costs and benefits of irriqation in Eastern Ontario. We understand that such tests are planned in joint efforts between the Fertilizer Institute and OMAF, as part of maximum yield tests. Information from farm users suggests that irrigation will increase strawberry yields by 20%, as well as providing early frost protection.

There are approximately 30,000 acres of agricultural soils in the Basin that are classed as moisture deficient. While these soils could benefit from supplemental irrigation, it would depend on the choice of crops grown. Increased use of irrigation will likely be a result of any expanded horticultural crop production because of the high crop value. With the increasing use of corn, pure alfalfa stands or intensively managed pasture will not occur unless there are extensive field trials documenting profitable experiences with irrigation.

This would suggest that irrigated acreage in the Basin will expand relatively slowly, perhaps doubling to something in the order of 4,000 - 5,000 acres over the next 10 years. The most likely areas for expansion will be on the sandy soils in the western and northern parts of the Basin.

The seasonal moisture deficit in Eastern Ontario is estimated to be 2 inches (50mm), or about 60,000 gals./acre. In a very dry year the amount could be four or five times this amount. Calculation by OMAF for surface reservoir storage to satisfy irrigation requirements in very dry years show that a reservoir with an area of about 2.5 acres and a depth of 10 feet will store sufficient water to irrigate 37 acres.

The lack of information about irrigation costs, benefits, and practices in Eastern Ontario indicates a need to establish a data collection and monitoring program in the Basin, in cooperation with area users of irrigation equipment and researchers. The program will provide a source of information about water supply needs for irrigation that can be incorporated into the water management system in the Basin.

It is recommended that irrigation be encouraged under limited conditions to ensure proper use of the water resource.

Careful consideration must be given to:

- water source - surface or ground water
- effect on downstream flow rates or aquifer storage capacity
- effect of runoff and/or infiltration of irrigated water -erosion and soil loss
- water quality - quality of input water
  ie. river or aquifer contamination,
  quality of output water
  ie. runoff and/or infiltration of chemicals and fertilizers
- financial management of system - use on high value crops - vegetables.

2.2.3 Land Development

Due to the geographic size of the Basin and the diversity of current land use patterns, it is evident that future land development will greatly effect agriculture. A portion of the Basin is directly influenced by urban growth pressures, and in many cases they produce conflicts with agriculture. Future planning will be important to ensure that productive land is not lost from agricultural use.

It is recommended that in general, when high quality agricultural land is involved, that the Foodland Guidelines be used for direction, and when land is poor quality that the most practical use be allowed. This planning should be carried out at the township level through the use of official plans and zoning bylaws.

Not only is it important to control the expansion of land uses which will decrease the agricultural land base, but it is also important to encourage expansion of this base. The major method by which this can be accomplished is to reintroduce idle agricultural land into production.

There were some 84,000 acres of unused or idle agricultural land identified and mapped in 1978-80 under the FARINEO program. About 44,000 were mapped as unused for less than 10 years, and the remainder for more than 10 years. Because the future use of this land is important in water resource management planning, a separate study was carried out by townships in the Basin to determine:

- the proportion of unused land that was suitable for agricultural use;
- why the land was currently unused;
- the type of land ownership;
- kinds of incentives needed to encourage a change of use.

The results of the study show that about 5,600 acres of idle land have gone back to agricultural use in the Basin. An additional 10,000 acres have potential for agricultural use but may require improvements such as drainage or brush clearing. The remaining 68,000 acres are generally not suitable for agricultural use; however, they may have potential for other uses.

2.2.4 Soil and Water Conservation

Five recommendations are set out below which we believe will enhance the productive capacity of the agricultural land base over the long term. At the same time these measures will minimize soil erosion and other negative impacts on water quality.

a) Develop an on-going soil and water conservation program, to be operated in conjunction with Soil and Crop Improvement Associations, 4-H Clubs and other farm groups, to demonstrate:
   - the need for, and benefits of, managing surface water run-off along ditches, streams and other water bodies, and to promote the use of grassed waterways to conserve water resources and minimize erosion;
   - means of minimizing bank erosion and related problems from livestock watering along streams;
   - the need to carefully manage the storage and use of animal manure;
   - the need to establish and maintain a continuous program of soil testing and analysis to maximize the beneficial impacts of continuous commercial fertilizer and chemical use while providing measures to protect the water resources of the area.

b) Monitor and assess soil erosion problems utilizing the Universal Soil Erosion Equation as a guideline. The factors of concern are:

- rainfall intensity or wind intensity
- raindrop size
- soil erodibility
- slope gradient and length
- vegetation cover
- conservation measures

Utilizing the Equation and site specific monitoring, it is possible to provide recommendations to individual landowners concerning the most suitable practices and programs to follow in that situation.

c) Monitor soil compaction problems and provide extension services regarding remedial and preventative measures, including recommendations concerning equipment size and use practices.

d) Alternative livestock watering methods should be investigated and a new approach implemented to reduce or eliminate the amount of in-stream watering that currently exists. This would correct the problem of water pollution originating from livestock mucking and defacating in the streams, particularly during periods of low flow. Farmers should be encouraged to use OMAF'S Productivity Incentive Grants for this purpose.

e) The Agricultural Code of Practice should be implemented by all townships in their planning and zoning to ensure that there is proper development of livestock operations as they relate to both land and water quality considerations. The townships should also take steps to strengthen the role of the Foodland Guidelines in shaping land use decision making at the municipal level, and if this is not possible legislative action should be considered.

2.3 ECONOMIC AND DEVELOPMENT IMPACTS

Data from Part 1 and the tables in Appendix D have enabled us to make some selective preliminary estimates of potential economic impacts in the Basin. These are of two types. Economic impacts look at the dollar values involved in different activities or events. Development impacts cover a much broader scope. They deal with the need for different kinds of goods and services generated by economic or political decisions to pursue certain courses of action. Development impacts may have many economic impacts.

The major potential economic impacts in this study are associated with tile drainage, flooding, and the expansion of cash crops. Tile drainage and the subsequent expansion of cash crop production would also have major development impacts at the farm level, industry and government levels.

2.3.1 Economic Impact of Tile Drainage

Tile drainage is considered to be essential for growers to produce high value cash crops such as corn and soybeans in Eastern Ontario. Only those farmers on Class 1 land can expect to have continuously optimal cropping results without drainage. The benefits of tile drainage include:

- earlier planting dates (7 - 10 days)
- later harvesting
- more efficient use of machinery
- increased root aeration
- higher soil temperatures for root growth
- improved crop yields
- reduction of risk.

It is the improved crop yields that most effectively demonstrate the economic importance of tile drainage to farmers. Comparing grain corn production on two different soil capability classes, the difference in net income per acre is $58 on class 2 land and $138 on class 3 land, in favour of drainage. (See Appendix D, Table 1)

Soil Class	Value of Crop		Cost of Production	Net Income	
	Undrained	Drained		Undrained	Drained*
2	$336/ac	$436/ac	$219/ac	$117/ac	$175/ac
3	$256/ac	$436/ac	$219/ac	$ 37/ac	$175/ac

*Annual cost of subsidized tile drainage at $42.00/ ac., subtracted from gross income.

5 5

Similarily with soybeans, a comparison of net income per acre to the producer on undrained and drained land shows that drainage raises the net income per acre on class 2 land by $28.00, and by $89.00 on class 3 land. (See Appendix D, Table 3)

Soil Class	Value of Crop		Cost of Production	Net Income	
	Undrained	Drained		Undrained	Drained*
2	$280/ac	$350/ac	$163/ac	$117/ac	$145/ac
3	$219/ac	$350/ac	$163/ac	$ 56/ac	$145/ac

In each of the above situations there is a net economic benefit from tile drainage because of increased yields. The same is true of grains. With hay and pasture the gains in yield are not sufficient to justify drainage costs. While there is a small net gain in income with hay on drained land versus undrained land, net returns are greater for pasture on class 1-4 land that is undrained.

What does not show in the above analysis is that these crops are often grown in rotation on the same land so that the grower obtains the higher net incomes from corn or soybeans and in turn benefits from the increased yields of hay and pasture as well. For example, if a farmer operated on a 6 year rotation of 2 years corn, 1 year grain, 2 years hay, and 1 year pasture on class 2 land, the average annual net income would be $83.00/acre if the land was undrained and $106.00 if it was tile drained.

Relating this economic benefit per acre, to the macro scale, it can be seen that if the 274,000 acres were drained as suggested from our study and planted in a rotation such as this, the overall economic improvement would be from $22,742,000 for undrained to $29,044,000 for drained. This would be an increase of $6,302,000 in the net value of crop production.

The situation is even more attractive for a cash crop where there might only be one year of hay and no pasture in the rotation.

Other economic benefits of tile drainage stem from the installation of the tile as well as building and maintaining outlet drains. Estimates in our Part I Report indicated that the current rate of tile drain installation in the Basin was approximately 10,000 acres per year. At a price of $400 per acre, this represents a $4 million a year business, plus building and maintenance of outlet drains.

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*Annual cost of subsidized tile drainage at $42/a, subtracted from gross income.

2.3.2 Economic Impact of Flooding

Agricultural lands that are affected by the 1:1.1 year flood are particularly susceptible to crop damage. The most severe damage is encountered with late spring and fall floods when crops are most susceptible. The annual early spring floods can result in economic losses as well; however, the farm community has adjusted to this event and the major problem is vehicle access for dairy and livestock farmers. In order to determine the magnitude of these losses, a correlation between crop value and crop areas within the flood zones has been made.

Table 5.3 in our Part I Report summarizes the following crop acreages within the four major flood zones:

Land Use		Acreage
P	Monoculture	728
C	Corn System	1,271
M	Mixed System	1,470
H	Hay System	3,365
HG	Pasture System	891

In order to simplify this information the following crop types were assigned to the Land Use types:

Crop	Land Use Types	Acreage
Corn	P and C	1,999
Mixed Grains	M	1,470
Hay	H	3,365
Pasture	HG	891

The overall economic value of each of these crop types can then be determined at two different levels; optimal and average crop value.

By extracting information from Tables 1 to 6 of Appendix D, the following figures can be generated:

	Optimal Value	Average Value
Corn	$436/acre	$304/acre
Grains	312	229
Hay	220	112
Pasture	100	60

(The optimal value is determined from the Value of Crop on Class 1-3 drained land. The Average Value is determined from the averaging figure for Value of Crop on Class 1-4 or 1-6 undrained land.)

These crop values can then be multiplied by the crop acreages to provide the following values:

	Optimal Value	Average Value
Corn	$ 871,560	$ 607,700
Grains	458,640	336,630
Hay	740,300	376,880
Pasture	89,100	53,460
	$2,159,600	$1,374,670

At present the cropping pattern within the flood zones resembles the average conditions elsewhere in the Basin. The different crops are grown on a variety of land classes and proportionately little of the area is drained. It therefore appears that the potential economic loss, if a 1:1.1 spring flood were to destroy the crops, would range from $944,330 for corn and grain crops to $1,374,670 for all agricultural lands.

If in the near future more agricultural land within the flood zone is improved through drainage, to resemble the optimal value situation, it is possible that this economic loss for one year could range from $1,330,200 to $2,159,600.

These calculations assume a complete crop loss over the entire area that is flooded annually. In fact the extent of the late spring/ summer, and fall floods is not documented. Local residents estimate that it occurs one year in five; however, the extent and severity of this flood is variable.

2.3.3 Economic Impact of Soil & Water Conservation Measures

Currently we do not believe there is sufficient good quality data and information to establish economic impacts of erosion control, channelization and storage, building location and design improvements, selection of crop varieties, improved management procedures and other agriculture-related water quality improvement measures. Several special studies concerning water quantity and quality, presently underway as part of the Basin water management plan, will contribute significantly in this regard, as will others outlined in this report.

We recommend that a cost/benefit analysis of remedial measures be carried out as soon as the appropriate studies are completed to provide the necessary data. The purpose of carrying out the analysis is to provide quantitative information to assess how the costs and benefits of remedial measures can be allocated fairly, and what kinds of incentives or penalties may be needed to implement the measures.

2.3.4 Rural Development

The review of market opportunities for agricultural commodities that can be produced in the Basin indicate there is potential for substantial economic and development impacts at the farm level and in the business community. While specific dollar values cannot be identified, on an a priori basis, some orders of magnitude can be estimated and in other cases the nature of the impacts can be identified.

At the farm level the impacts will stem primarily from new and expanded crop acreages, improved varieties, and the facilities and services required to support these changes. The industry level impacts will stem from servicing farm and market requirements. There is no clear cut distinction about which will come first. In some cases industry will be acting in response to farm level decisions (ie. new grain handling and storage systems), while in others industry will move first and the farmers will respond (ie. food and feed processing) by producing a given commodity.

a) Farm-level impacts

Expansion of new and existing cash crops in the Basin appear to have the greatest economic potential over the next five years. The study suggests that the potential exists in the Basin to double the grain corn acreage from 50,000 to 100,000 acres and to increase soybean production from the estimated current level of 2,000 acres to 30,000 acres. We believe that the different markets can easily absorb these increases if the producers emphasize quality of product.

At current prices we estimate the annual farm value of an additional 50,000 acres of corn is $15.2 million and the annual value of an additional 28,000 acres of soybeans would be $7.2 million. We have also estimated that there is a potential market through import substitution for an additional 2,700 acres of eleven fruit and vegetables valued at $3.8 million. The value of all these crops could amount to about $26.2 million annually.

This kind of production increase would require substantial additional on-farm investments and new needs for additional resources and services. Some of the anticipated needs at the farm level include:

- additional new tillage, harvesting and handling equipment
- more fertilizer, chemicals and seed
- buy or lease more land
- improved land use
- on-farm handling and storage facilities for different crops
- new and improved buildings
- better identification of specific market opportunities
- special extension and consulting services
- additional analytical laboratory services
- additional farm labour and management inputs
- more and better financing
- improved channels of communications between growers and their markets.

More detailed estimates of expenditures for expanded crop production would require a specific set of assumptions concerning the allocation of the expanded acreage between existing growers and new growers, the acreage per farm, and the way in which the crops would be handled and marketed.

b) Industry-level impacts

Increased commodity production in the Basin will generate considerable new business activity. In turn, a number of business investment decisions for new or expanded processing and manufacturing facilities could generate additional farm commodity production, especially for beef and hogs in the case of a slaughtering facility, oil seeds from crushing plants, or fruit and vegetables from a processing facility. Some of the kinds of impacts that could be anticipated at the industry level as a result of expanded farm commodity production include:

- expansion of equipment and production input sales
- expansion of repair and maintenance facilities
- new food processing and feed manufacturing facilities
- expansion of commodity handling, storage and transportation
- problem-solving research and analytical services
- additional people with technical and management skills, and skilled tradesmen.

c) Government-level impacts

The role of government in rural economic development ranges from that of a passive facilitator to an aggressive initiator of new activities. Since there is already a development-oriented agricultural community in the Basin, government can effectively enhance the existing process by being active as a facilitator to off-set restraints and make opportunities more accessible to growers, processors and sellers. Some of the main ways in which government can have positive impacts on agricultural development activity in the Basin include:

- financial assistance for farmers and related businesses to off-set the negative impacts of high interest rates on both capital and operating costs
- additional funding for applied research for local crop and livestock production and management
- additional funding for specialized market studies
- improved funding for crop handling and storage facilities
- expanded and improved analytical services (soils, water, plant tissue and feed)
- better coordination and less red tape in the delivery of government services to farmers and related businesses.

Appendix A

Population Structure 1961 to 1976

The following tables are a detailed breakdown by township of the figures presented in the text.

The figures differ slightly from those presented by Municipal Planning Consultants because of definitional differences dictated by reporting requirements. The only major difference occurs in the definition of urban population, however it in turn affects the rural population figures. In the tables presented here, urban populations are defined as centres with 1,000 people or more per square mile. The result of this is that small rural hamlets and villages, are included in the rural non-farm sector. (Refer to footnotes on 1976 population structure for definitions of other sectors.) For the purposes of the MPC study, however, it was necessary to develop tables which separated the hamlets and villages from rural non-farm. By comparing Tables 7 and 8 of the MPC report with the tables in this appendix it can be seen that if hamlets and villages (the urban column in MPC) are subtracted from the rural non-farm, the resulting figures will agree with the rural non-farm figures in the MPC study.

POPULATION STRUCTURE
1976

Division[1]	Farm[2]	Rural[3] Non-Farm	Rural Total	Urban[4]	Total Population
Basin Twps. In Dundas					
Matilda	818	2393	3211		4489
Iroquois				1278	
Mountain	881	1793	2674		2674
Williamsburg	658	2412	3070		5258
Morrisburg				2188	
Winchester	1265	1752	3017		6086
Chesterville				1324	
Winchester				1745	
TOTAL	3622	8350	11972	6535	18507
Basin Twps. in Glengarry					
Kenyon	693	1906	2599		6949
Alexandria				3498	
Maxville				852	
Lochiel	1103	1913	3016		3016
TOTAL	1796	3819	5615	4350	9965
Basin Twps. in Grenville					
Augusta	532	5641	6173		11148
Prescott				4975	
Edwardsburg	568	3705	4273		6140
Cardinal				1867	
S. Gower	191	707	898		898
Oxford	469	2736	3205		5749
Kemptville				2544	
TOTAL	1760	12789	14549	9386	23935
Basin Twps. in Leeds					
Elizabethtown	653	6327	6980	0	6980
TOTAL	653	6327	6980	0	6980
Basin Twps. in Ottawa/Carleton					
Cumberland	879	11498	12377	0	12377
Glouchester	460	56056	56516	0	56516
Osgoode	1225	7732	8957	0	8957
TOTAL	2564	75286	77850	0	77850
Basin Twps. in Prescott					
Alfred	506	1313	1819		2924
Alfred				1105	
Caledonia	610	702	1312		1312
W. Hawkesbury	320	2016	2336		13693
Hawkesbury				9789	
Vankleek				1568	
N. Plantagenet	436	1946	2382		3301
Plantagenet				919	
S. Plantagenet	792	916	1708		2397
St. Isidore				689	
TOTAL	2664	6893	9557	14070	23627

Population Structure 1976 (Cont'd)

2.

Division[1]	Farm[2]	Rural[3] Non-Farm	Rural Total	Urban[4]	Total Population
Basin Twps. in Russell					
Cambridge	732	2932	3664		5086
Casselman				1422	
Clarence	775	5007	5782		9712
Rockland				3930	
Russell	871	4066	4937		4937
TOTAL	2378	12005	14383	5352	19735
Basin Twps. in Stormont					
Finch	816	1468	2284		2691
Finch				407	
Osnabruck	537	3334	3871		3871
Roxborough	826	2184	3010		3010
TOTAL	2179	6986	9165	407	9572
TOTAL FOR BASIN TWPS.	17616	132455	150071	40100	190171

SOURCES: Census of Canada, Population: Geographic Distribution
- Census Divisions and Subdivisions-Ontario, 1961-76, Statistics Canada
- Urban and Rural Distribution, 1961-76, Statistics Canada

Ontario Agricultural Census, 1961-76, Statistics Canada

Footnotes

[1] Divisions are based on Townships which are wholly or partially within the Basin area and all the urban centers within those Townships within or outside the Basin.

[2] Farm population is defined as those persons living in dwellings situated on a Census farm. A Census farm is defined as follows:

1976 - an agricultural holding of one or more acres with sales of $1,200 or more

1961 to 1971 - an agricultural holding with sales of $50.00 or more

[3] Rural non-farm population is defined as those persons living in dwellings on non-agricultural holdings which are not within urban areas.

[4] Urban populations are those persons living in areas with 1000 persons or more per square mile.

POPULATION STRUCTURE
1971

Division	Farm	Rural Non-Farm	Rural Total	Urban	Total Population
Basin Twps. in Dundas					
Matilda	1143	1907	3050		4274
Iroquois				1224	
Mountain	1279	1154	2433		2433
Williamsburg	946	2100	3046		5101
Morrisburg				2055	
Winchester	1669	1153	2822		5649
Chesterville				1252	
Winchester				1575	
TOTAL	5037	6314	11351	6106	17457
Basin Twps. in Glengarry					
Kenyon	1071	1504	2575		6661
Alexandria				3240	
Maxville				846	
Lochiel	1461	1594	3055		3055
TOTAL	2532	3098	5630	4086	9716
Basin Twps. in Grenville					
Augusta	963	4577	5540		10705
Prescott				5165	
Edwardsburg	882	3032	3914		5779
Cardinal				1865	
S. Gower	338	407	745		745
Oxford	769	1843	2612		5025
Kemptville				2413	
TOTAL	2952	9859	12811	9443	22254
Basin Twps. in Leeds					
Elizabethtown	1025	5488	6513	0	6513
TOTAL	1025	5488	6513	0	6513
Basin Twps. in Ottawa/Carleton					
Cumberland	1594	7700	9294	0	9294
Glouchester	858	35335	36193	0	36193
Osgoode	1764	5640	7404	0	7404
TOTAL	4216	48675	52891	0	52891
Basin Twps. in Prescott					
Alfred	868	857	1725		2955
Alfred				1230	
Caledonia	378	389	1267		1267
W. Hawkesbury	540	1389	1929		13104
Hawkesbury				9484	
Vankleek				1691	
N. Plantagenet	695	1342	2037		2946
Plantagenet				909	
S. Plantagenet	1053	672	1725		2340
St. Isidore				615	
TOTAL	4034	4649	8683	13929	22612

Population Structure 1971 (Cont'd)

Division	Farm	Rural Non-Farm	Rural Total	Urban	Total Population
<u>Basin Twps. in Russell</u>					
Cambridge	1123	1432	2555		3892
Casselman				1337	
Clarence	1503	3086	4589		8238
Rockland				3649	
Russell	1260	2897	4157		4157
TOTAL	3886	7415	11301	4986	16287
<u>Basin Twps. in Stormont</u>					
Finch	1204	1089	2293		2690
Finch				397	
Osnabruck	872	2500	3372		3372
Roxborough	1262	1678	2940		2940
TOTAL	3338	5267	8605	397	9002
TOTAL FOR BASIN TWPS.	27020	90765	117785	38947	156732

POPULATION STRUCTURE
1966

Division	Farm	Rural Non-Farm	Rural Total	Urban	Total Population
Basin Twps. in Dundas					
Matilda	1578	1521	3099		4540
Iroquois				1441	
Mountain	1634	821	2455		2455
Williamsburg	1351	1593	2944		4882
Morrisburg				1938	
Winchester[a]	2034	487	2521		5229
Chesterville				1258	
Winchester				1450	
TOTAL	6597	4422	11019	6087	17106
Basin Twps. in Glengarry					
Kenyon	1595	990	2585		6220
Alexandria				2864	
Maxville				771	
Lochiel	1955	1266	3221		3221
TOTAL	3550	2256	5806	3635	9441
Basin Twps. in Grenville					
Augusta	1111	4120	5231		10407
Prescott				5176	
Edwardsburg	1308	2518	3826		5773
Cardinal				1947	
S. Gower	443	244	687		687
Oxford	977	1420	2397		4579
Kemptville				2182	
TOTAL	3839	8302	12141	9305	21446
Basin Twps. in Leeds					
Elizabethtown	1406	5666	7072	0	7072
TOTAL	1406	5666	7072	0	7072
Basin Twps. in Carleton[b]					
Glouchester	1555	21667	23222		23222
Osgoode	2468	4222	6690	0	6690
TOTAL	4023	25889	29912	0	29912
Basin Twps. in Prescott					
Alfred	1304	467	1771		2996
Alfred				1225	
Caledonia	1004	297	1301		1301
W. Hawkesbury[c]	671	1228	1899		12749
Hawkesbury				9188	
Vankleek				1662	
N. Plantagenet[d]	1149	778	1927		2763
Plantagenet				836	
S. Plantagenet[e]	1295	545	1840		2370
St. Isidore				530	
TOTAL	5423	3315	8738	13441	22179

Population Structure 1966 (Cont'd) 2.

Division	Farm	Rural Non-Farm	Rural Total	Urban	Total Population
Basin Twps. in Russell					
Cambridge	1510	878	2388		3615
Casselman				1227	
Clarence[f]	2065	1722	3787		7300
Rockland				3513	
Russell	1635	2328	3963		3963
Cumberland	2042	4187	6229		6229
TOTAL	7252	9115	16367	4740	21107
Basin Twps. in Stormont					
Finch	1510	756	2266		2650
Finch				384	
Osnabruck	1281	1946	3227		3227
Roxborough	1623	1185	2808		2808
TOTAL	4414	3887	8301	384	8685
TOTAL FOR BASIN TWPS.	36504	62852	99356	37592	136948

Footnotes

[a] Chesterville annexed from Winchester in 1964.

[b] Between the 1966 and 1971 censuses, Cumberland Township was transferred from Russell County to Carleton County and the County was renamed Ottawa/Carleton County.

[c] Hawkesbury annexed from W. Hawkesbury in 1966.

[d] Village of Plantagenet incorporated in 1963.

[e] Village of St. Isidore incorporated in 1965.

[f] Rockland annexed from Clarence in 1966.

POPULATION STRUCTURE
1961

Division	Farm	Rural Non-Farm	Rural Total	Urban	Total Population
Basin Twps. in Dundas					
Matilda	1694	1423	3117		4253
Iroquois				1136	
Mountain	1626	917	2543		2543
Williamsburg	1485	1515	3000		4820
Morrisburg				1820	
Winchester	2159	710	2869		5546
Chesterville				1248	
Winchester				1429	
TOTAL	6964	4565	11529	5633	17162
Basin Twps. in Glengarry					
Kenyon	1765	1056	2821		6222
Alexandria				2597	
Maxville				804	
Lochiel	1902	1625	3527		3527
TOTAL	3667	2681	6348	3401	9749
Basin Twps. in Grenville					
Augusta	1112	3803	4915		10281
Prescott				5366	
Edwardsburg	1269	2377	3646		5590
Cardinal				1944	
S. Gower	422	258	680		680
Oxford	1033	1305	2338		4297
Kemptville				1959	
TOTAL	3836	7743	11579	9269	20848
Basin Twps. in Leeds					
Elizabethtown	1424	5133	6557	0	6557
TOTAL	1424	5133	6557	0	6557
Basin Twps. in Carleton					
Glouchester	1608	16693	18301	0	18301
Osgoode	2360	3426	5786	0	5786
TOTAL	3968	20119	24087	0	24087
Basin Twps. in Prescott					
Alfred	1397	526	1923		3118
Alfred				1195	
Caledonia	1123	284	1407		1407
W. Hawkesbury	689	1104	1793		12189
Hawkesbury				8661	
Vankleek				1735	
N. Plantagenet	1296	1538	2834		2834
Plantagenet				-	
S. Plantagenet	1438	955	2393		2393
St. Isidore				-	
TOTAL	5943	4407	10350	11591	21941

Population Structure 1961 (Cont'd)

Division	Farm	Rural Non-Farm	Rural Total	Urban	Total Population
Basin Twps. in Russell					
Cambridge	1742	768	2510		3737
Casselman				1227	
Clarence	2521	2206	4727		7764
Rockland				3037	
Russell	1815	2048	3863		3863
Cumberland	1906	3572	5478		5478
TOTAL	7984	8594	16578	4264	20842
Basin Twps. in Stormont					
Finch	1602	811	2413		2799
Finch				386	
Osnabruck	1335	2069	3404		3404
Roxborough	1762	1346	3108		3108
TOTAL	4699	4226	8925	386	9311
TOTAL FOR BASIN TWPS.	38485	57468	95953	34544	130497

APPENDIX B

Quota Transfers

The Ontario Milk Marketing Board initiated an exchange system in March 1980 to allow farmer to farmer transfers of both Group I and Market Sharing Quota. The Board has recently completed a review of quota transfers from April to December 1980. The results indicate that both regional and structural adjustment have occurred during the few months the quota has been in existence.

The number of producers in Eastern Ontario who have bought or sold quota and the amount of quota transferred are shown in Table 2. The transfers indicate that Region 1 farmers increased their quotas while the Region 3 farmers reduced theirs. The only area with a larger net increase in quota was Region 10 made up of Perth and Waterloo counties. It is rather difficult to interpret the importance of the quota transfers unless one has the amount of quota already held by the farmers of each Region.

The initial conclusion to be drawn regarding quota transfers is that milk production is increasing in all counties in the Basin except Carleton-Ottawa. Production is decreasing in the counties directly west of the Basin, such as Lanark, Renfrew, Hastings, Prince Edward and Frontenac. The other parts of the province which were large net purchasers of quota were Perth and Waterloo, and the Wentworth, Niagara, Haldimand, Brant area. The results of the nine quota transfer exchanges may or may not be typical of what occurs in the future because the system was only started in April 1980 and a backlog of sales may have occurred after it was initiated.

While the type of transfers were not analyzed by region, it is interesting to note the following trends in terms of structural changes. Of the 520 farmers who purchased Group I Quota, only 7% were new producers but 68% were increasing their quota allotment by more than 25%. The remainder were almost entirely producers increasing their quota by less than 25%. The majority, 86%, of Group I Quota sellers sold all the quota they held indicating a withdrawal from milk production.

Of the 1,552 farmers purchasing MSQ, just over four-fifths, 81%, did so because they were in an over quota production situation. Producers wishing to increase their MSQ by 10 to 25% were more common as purchasers than those wishing to make larger or smaller increases. The producers who were increasing their MSQ by more than 25% actually purchased a larger quantity of quota than all the rest combined. A total of 1,552 purchased used or unused MSQ.

Table 2: Quota Transfers April to December 1980

Area	No. of Producers	Transfers	Purchase l.	Sales l.	Net l.
Region 1 Russell, Prescott and Glengarry	1079	283	4,526,121	2,915,751	1,610,370 [1]
Region 2 Grenville, Dundas, Stormont, Leeds	1185	269	3,517,278	3,168,286	348,992
Region 3 Carleton, Lanark, Renfrew	755	248	2,872,080	4,541,801	(1,669,721)

[1] Production represented by quota purchases is equal to 283.5 x Group I purchases + MSQ purchases. The production represented by quota sold is equal to 283.5 x Group I Sales + MSQ sales. The factor of 283.5 used in converting Group I purchases and sales to an annual production base was calculated on the basis of an average payout ratio of 73 per cent and an exclusion factor of 6.4 per cent.

Sales of MSQ were made by 1,342 producers,only 13.3% of whom sold all the quota they held. This minority of sellers disposed of 40% of all quota sold. Overall, 172 producers left the industry, 145 are presumed to be leaving because they sold more than 25% of their quota and 91 producers entered the industry. Only 51 of the new entrants were truly new producers because the other 40 were former producers, 17, cream producers, 18, or they had previously been involved in a dairy farm in some manner, 5.

The quota exchange data suggest that the number of dairy farms is continuing to decrease, the size of farms is increasing and industrial producers are purchasing Group I quota.

APPENDIX C

Recommended additional projects to provide data and information for agricultural development and resource management in the South Nation River Basin and Eastern Ontario.

1. Development Planning

   Prepare an economic planning framework for agricultural development and resource management in Eastern Ontario so that farmers, businessmen and governments can identify and communicate their specific requirements, expectations and responsibilities in a forward planning context. The planning framework will act as a guide in shaping short and long term investment, program and policy decisions according to the needs and aspirations of Eastern Ontario agriculture. Participants in the planning process should specifically include the Ontario Federation of Agriculture; commodity producer groups; commodity handling, storage, processing and manufacturing groups; agricultural service industries, including financial interests; food wholesale and retail representatives; as well as the three levels of government.

2. Dairy and Livestock Industry

   a) A study should be undertaken to find ways and means to utilize more of the dairy beef that could be produced in the Basin.

   b) Examine alternate business structures and working arrangements for dairy farmers that could provide more opportunity and flexibility for:
      - those wishing to leave the industry;
      - those wishing to enter the industry;
      - those wishing to expand their existing dairy operations.

   c) A study should be carried out to determine how many pigs are exported annually as weaners from Eastern Ontario, and what the economic potential and the implications are for raising them to market weight here. This study should have a high priority because of the possibility that the Québec market might be withdrawn.

   d) The feasibility of establishing a major new meat packing facility in Eastern Ontario or the expansion of existing facilities should be examined to determine whether or not a larger portion of the meat consumed in this area could be economically killed and processed here. The study should consider:
      - current markets and market structure for live animals, meat and meat products;

- changing patterns of meat consumption;
- changing patterns of farm production;
- the potential for special marketing arrangements ie. long term contracts;
- economics of scale of smaller operations, given rapid escalation of transportation and capital costs;
- locational considerations, including environmental impacts.

3. Corn and Soybeans

a) Further study of cash markets for Eastern Ontario grain corn is needed to provide more information concerning the specific requirements of each type of market as to:

- quality and quantity needed;
- drying, grading, storage and delivery requirements;
- organizational needs for marketing system;
- on-farm facilities and equipment needed;
- possible need for specialized large scale collection/receiving stations (eg. for high moisture corn for the Canada Starch Plant);
- buying and selling arrangements.

A feasibility study is needed to establish the long term economic potential of soybeans (and other oil seeds) as a cash crop in Eastern Ontario, to investigate markets, and to determine what facilities, services and organizations are required for development of the crop. The study should include examination of the dairy and livestock market for soybean oil meal (and other oil seed meal) in Eastern Ontario, Western Québec and Northern New York State to determine at what stage and under what conditions that an oilseed crushing plant might be feasible in Eastern Ontario.

4. Forages

   a) The potential of pure stands of alfalfa as a source of protein for livestock in the form of silage and hay needs to be assessed in terms of protein cost and livestock performance versus other protein sources, as well as the implications for crop rotations and land management.

   b) The export markets for hay should be examined to establish their potential for further development of high quality hay as a cash crop. This is important because of the beneficial soil building and nitrogen fixing characteristics of alfalfa - in addition to the income potential for growers.

   c) A feasibility study should be carried out to assess the economics of an alfalfa dehydrating plant in the Basin to serve local and export feed markets.

   d) A research study should be undertaken to develop a "wet foot" variety of alfalfa that is better adapted to the climatic conditions of Eastern Ontario.

5. Horticultural Commodities

   A two part study should be undertaken to identify possible markets for fresh produce grown in Eastern Ontario, in Ontario, Québec and New York State. The second part of the study should examine the potential for fruit and vegetable processing in Eastern Ontario to determine whether or not the area has a competitive advantage for growing and processing certain commodities for sale in the Toronto-Ottawa-Montréal markets or elsewhere (eg. frozen vegetables or small fruits). In both cases the study should identify how the markets can be effectively penetrated and held by Eastern Ontario produce.

6. Use of commercial fertilizers and chemicals

   Conduct a sample survey of farmers, homeowners, companies, municipalities and government agencies to determine the nature and extent of the use of these materials in the Basin. The data to be collected should include:

   - type and amount of materials used
   - rate, frequency and timing of applications

- location and purpose of use
- methods of application, handling and storage.

Additional sources of information would include custom operators, sales outlets, agricultural representatives, government and company specialists.

7. Manure Handling and Disposal

Classify manure handling and disposal systems in the Basin to determine what steps are necessary, if any, to maximize the beneficial impacts of manure as a source of plant nutrients and organic matter, and to minimize the water pollution potential of manure.

8. Classification of Wetlands

A classification system needs to be developed and applied to wetlands in the basin to access their importance and sensitivity in the present hydrological regime, ie. control of flood waters, and to determine the most beneficial future use, such as conservation lands vs.agriculture.

9. Sub-basin Modelling

Further work to develop the agricultural model at the sub-basin level would provide a useful tool in the preparation and assessment of different drainage strategies and water management plans by simulating the impacts of these decisions on land use patterns, and vice versa.

10. Farm-oriented Research Needs

A survey of farm organizations and commodity groups in Eastern Ontario should be conducted to determine what kinds of local problems should be given research priority from the point of view of problem solving, removal of constraints at the farm level, and providing access to new opportunities. The "delphi" technique could have application in this regard to provide the framework for conducting the study establishing priorities.

APPENDIX D

COSTS AND RETURNS FOR PRODUCING SELECTED CROPS, WITH AND WITHOUT DRAINAGE

(Source: Agronomy Department
Kemptville College of Agricultural Technology)

1 Costs and Returns With and Without Drainage- Grain Corn

Soil Class	Yield-bu.		Increase	Value of Crop[2]		Cost of Production[3]	Cost of Drainage[4]		Net Income		
	Undrained	Drained[1]		Undrained	Drained				Undrained	Drained	
							a	b		a	b
1	109	109	-	436	436	219	-	-	217	-	-
2	84	109	25	336	436	219	64	42	117	153	175
3	64	109	45	256	436	219	64	42	37	153	175
4	47	84	37	188	336	219	64	42	- 31	53	75

Assumptions

1. When drained, Class 2 and 3 yield same as Class 1 and Class 4 same as Class 2.

2. Value of crop- $4.00/bushel.

3. Cost of production is Kemptville cost + 25% with no charge for land.

4.a Annual cost of drainage based on $400 per acre amortized at 15% over 20 years is $63.90/year.

b Annual cost of drainage based on $300 per acre amortized at 8% over 10 years ($44.70) plus $100 amortized at 15% over 20 years ($19.98) is $64.68/year for first 10 years and $19.98/year for second ten years or an average of $42.33/year over the 20 year term.

2 Costs and Returns With and Without Drainage-Silage Corn

Soil Class	Yield-ton		Increase	Value of Crop		Cost of Production[3]	Cost of Drainage[4]		Net Income		
	Undrained	Drained[1]		Undrained[2]	Drained		a	b	Undrained	Drained a	b
1	18.2	18.2	-	436	436	208	-	-	228	-	-
2	14.0	18.2	4.2	336	436	208	64	42	128	164	186
3	10.7	18.2	7.5	257	436	208	64	42	49	164	186
4	7.8	14.0	6.2	187	336	208	64	42	- 21	64	86

Assumptions

1. When drained, Class 2 and 3 yield same as Class 1 and Class 4 same as Class 2.
2. Value of crop- $24.00/ton.
3. Cost of production is Kemptville cost + 25% with no charge for land.

4.a Annual cost of drainage based on $400 per acre amortized at 15% over 20 years is $63.90/year.

b Annual cost of drainage based on $300 per acre amortized at 8% over 10 years ($44.70) plus $100 amortized at 15% over 20 years ($19.98) is $64.68/year for first 10 years and $19.98/year for second ten years or an average of $42.33/year over the 20 year term.

3 Costs and Returns With and Without Drainage- Soybeans

Soil Class	Yield-bu.		Increase	Value of Crop		Cost of Production[3]	Cost of Drainage[4]		Net Income		
	Undrained	Drained[1]		Undrained[2]	Drained		a	b	Undrained	Drained a	b
1	40	40	-	350	350	163	-	-	187	-	-
2	32	40	8	280	350	163	64	42	117	123	145
3	25	40	15	219	350	163	64	42	56	123	145
4	20	32	12	175	280	163	64	42	8	53	75

Assumptions

1. When drained, Class 2 and 3 yield same as Class 1 and Class 4 same as Class 2.
2. Value of crop- $8.75/bushel.
3. Cost of production is Kemptville cost + 25% with no charge for land.
4. a Annual cost of drainage based on $400 per acre amortized at 15% over 20 years is $63.90/year.

   b Annual cost of drainage based on $300 per acre amortized at 8% over 10 years ($44.70) plus $100 amortized at 15% over 20 years ($19.98) is $64.68/year for first 10 years and $19.98/year for second ten years or an average of $42.33/year over the 20 year term.

4 Costs and Returns With and Without Drainage-Barley/Mixed Grain/Oats

Soil Class	Yield-bu.		Increase	Value of Crop		Cost of Production[3]	Cost of Drainage [4]		Net Income		
	Undrained	Drained[1]		Undrained[2]	Drained		a	b	Undrained	Drained	
										a	b
1	81	81	-	312	312	106	-	-	206	-	-
2	67	81	14	258	312	106	64	42	152	142	164
3	52	81	29	200	312	106	64	42	94	142	164
4	38	67	29	146	258	106	64	42	40	88	110

Assumptions

1. When drained, Class 2 and 3 yield same as Class 1 and Class 4 same as Class 2.
2. Value of crop - $3.85/bushel.
3. Cost of production is Kemptville cost + 25% with no charge for land.

4\. a Annual cost of drainage based on $400 per acre amortized at 15% over 20 years is $63.90/year.

b Annual cost of drainage based on $300 per acre amortized at 8% over 10 years ($44.70) plus $100 amortized at 15% over 20 years ($19.98) is $64.68/year for first 10 years and $19.98/year for second ten years or an average of $42.33/year over the 20 year term.

5 Costs and Returns With and Without Drainage- Hay

Soil Class	Yield-bu.		Increase	Value of Crop		Cost of Production[3]	Cost of Drainage[4]		Net Income		
	Undrained	Drained[1]		Undrained[2]	Drained				Undrained	Drained	
							a	b		a	b
1	4.4	4.4	-	220	220	150	-	-	70	-	-
2	3.5	4.4	0.9	175	220	150	64	42	25	6	28
3	2.9	4.4	1.5	145	220	130	64	42	15	26	48
4	2.6	3.5	0.9	130	175	110	64	42	20	1	23
5	0.9	2.6	1.7	45	145	90	64	42	-45	-9	13
6	0.3	2.6	2.3	15	145	90	64	42	-75	-9	13

Assumptions

1. When drained, Class 2 and 3 yield same as Class 1 and Class 4 same as Class 2.

2. Value of crop- $50.00/ton.

3. Cost of production is Kemptville cost + 25% with no charge for land.

4. a Annual cost of drainage based on $400 per acre amortized at 15% over 20 years is $63.90/year.

   b Annual cost of drainage based on $300 per acre amortized at 8% over 10 years ($44.70) plus $100 amortized at 15% over 20 years ($19.98) is $64.68/year for first 10 years and $19.98/year for second ten years or an average of $42.33/year over the 20 year term.

6 Costs and Returns With and Without Drainage- Pasture

Soil Class	Yield In Days		Increase	Value of Crop		Cost of Production[3]	Cost of Drainage		Net Income		
	Undrained	Drained[1]		Undrained[2]	Drained		a	b	Undrained	Drained a	Drained b
1	200	200	-	100	100	25	-	-	75	11	33
2	175	200	25	88	100	25	64	42	63	11	33
3	145	200	55	73	100	25	64	42	48	11	33
4	130	175	45	65	88	25	64	42	40	-1	21
5	45	130	85	23	65	25	64	42	-2	-24	-2
6	15	130	115	8	65	25	64	42	-17	-24	-2

Assumptions

1. When drained, Class 2 and 3 yield same as Class 1 and Class 4 same as Class 2.
2. Value of crop- 50¢ per day per acre.
3. Cost of production is Kemptville cost + 25% with no charge for land.
4. a Annual cost of drainage based on $400 per acre amortized at 15% over 20 years is $63.90/year.

   b Annual cost of drainage based on $300 per acre amortized at 8% over 10 years ($44.70) plus $100 amortized at 15% over 20 years ($19.98) is $64.68/year for first 10 years and $19.98/year for second ten years or an average of $42.33/year over the 20 year term.