



Heritage Resources Centre
Centre des ressources du patrimoine

Nominating the Grand as a Canadian Heritage River

Occasional Paper 13

University of Waterloo

Nominating the Grand as a Canadian Heritage River

Edited by
J.G. Nelson and Pauline C. O'Neill

A Study for the Canadian Heritage Rivers Board
and the Grand River Conservation Authority

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1989 Information Program

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1989 Information Program

Ayumi Bailly

SUMMARY

The information strategy for the 1989 Grand River Heritage Study began with an information package which was developed for advance notification of the public meetings held in June. The package contained a letter of invitation to the meetings, a copy of the advertising flyer, a two-page information sheet on the Grand River Heritage Study, and copies of two of the GRCA's publications ("On the Grand" and "Your Valley"). These packages were mailed to approximately 2500 people, including the GRCA membership, politicians (local, MPP, and MP), planning departments, community services, local heritage agencies, and the media (see the Information Log for more details). Advertisements for the public meetings were also placed with the local newspapers in the areas where the meetings were to be held. The summary from the open houses includes an analysis of the participants, the information gathered through registration, all the comments received on the planning document, and a loose transcription of the dialogue that took place during the meetings.

A background paper or planning document was used to guide discussions at the public meetings, and was structured as a series of questions addressing some of the planning concerns faced by the study team. The paper subsequently underwent several revisions as work on the study progressed.

The Planners' Workshop was held near the end of July to present the case of the Grand as a Canadian Heritage River to the professionals who would be involved in the implementation of the program should it be approved. The planners of all the municipalities along the main stem of the Grand were invited. The response to the invitations was excellent; seventeen attended of the twenty-five invited.

Other means of getting information to the public were utilized as well. Much newspaper coverage was given during the summer of 1989 by the Kitchener-Waterloo Record to issues relating to the Grand River. One further open house was scheduled for November to solicit feedback on the results of the summer's research. A summary from this meeting is also included.

Several individual presentations were also made by the Study Director over the course of the summer and fall. These presentations were made to interested organizations on a request basis, and were intended primarily for information dissemination.

INFORMATION LOG**Mailings**

- Content: - advertisement of open house meetings; background information for study; flyers from GRCA
- Recipients: - mailing volume approx. 2500; targeted to:
 municipal offices--recreation, planning, community services
 municipal councillors
 MPs/MPPs
 Conservation Authorities
 historical societies
 heritage societies
 libraries
 Chambers of Commerce
 municipal information centres
 Women's Institutes
 GRCA staff, members
 businesses
 media contacts
- Date: - mailed week of May 23, 1989

Media Advertisements

- Content: - same copy inserted in the following newspapers:
 Cambridge Reporter
 Brantford Expositor
 Guelph Mercury
 Grand River Sachem (Caledonia)
 Fergus-Elora News Express
- Date: - Cambridge, Brantford, Guelph: June 9, Nov. 9, 1989
 - Sachem, News Express: June 7, Nov. 9, 1989

Media Coverage

- Source: - CKCO-TV News, interview with Nelson
 Date: - June 14, 1989
 - November 1989
- Source: - CKOC Hamilton, radio interview with Nelson
 Date: - June 1989
- Source: - Brant News, interview with Nelson
 Date: - June 21, 1989
- Source: - K-W Record, interviews with Nelson
 Date: - June 15 & 16, 1989
 - July, November 1989

Source: - Fergus-Elora News Express
Date: - June 1989

Source: - Brantford Expositor
Date: - June 1989

Source: - Guelph Mercury
Date: - November 1989

Source: - Paris Star
Date: - November 1989

Source: - OPPI
Date: - October 1989

Public Meetings

Content: - see Public Meeting Agenda

Recipients: - approx. 80 participants

Date: - Caledonia, June 13, 1989
- Cambridge, June 14, 1989
- Fergus, June 15, 1989

Date: - November 13, 1989
- Grand River Conservation Authority, Cambridge
- approx. 80 participants

* see attached summary of open house meetings for full details

Presentations

February, 1989	Gordon Nelson	University of Augsburg, Germany Institute for Canadian Studies (conference on Canadian Studies)
March, 1989	Gordon Nelson	Planning 801/802 Ph.D. forum, University of Waterloo
May, 1989	Gordon Nelson	Canadian Association of Geographers' Annual Meeting Chicoutimi, Quebec Special Session (Canadian Heritage Rivers)
June 19, 1989	Pauline O'Neill	Natural Heritage League Co-ordinating Committee (Grand River Conservation Authority)
July 17, 1989	Gordon Nelson	Riverfest (Caledonia)
July 26, 1989	Gordon Nelson	Planners' Workshop

		held at the University of Waterloo
July 27, 1989	Gordon Nelson	Ecological and Environmental Advisory Committee, Regional Municipality of Waterloo
Sept. 26, 1989	Gordon Nelson	Waterloo Historical Society
Oct. 12, 1989	Gordon Nelson	GRHS Steering Committee
Oct. 23, 1989	Gordon Nelson	Kitchener-Waterloo Field Naturalists
Oct. 26, 1989	Gordon Nelson David Balser	Natural Heritage League
Nov. 16, 1989	Gordon Nelson	GRHS Steering Committee
Nov. 22, 1989	Gordon Nelson	GRCA Members Committee

* Note: An offer was extended to Six Nations for a presentation to them by Nelson, but the offer was declined. They requested to receive only written material from the study.

Public Meeting Agenda

June 13, 14 and 15, 1989

1989 GRAND RIVER HERITAGE STUDY

Planning for the Grand as a Canadian Heritage River

Open House Meeting

The purpose of this meeting is to obtain public input to the planning process for the Grand River as a Canadian Heritage River. The Canadian Heritage Rivers System is a way of identifying rivers, or sections of rivers, with outstanding natural, human (historic) or recreational features, and for managing for the appropriate use and conservation of these features.

We welcome your comments at any point in the discussions this evening.

- 7:00 p.m. Introductory Comments
- 7:15 p.m. The Canadian Heritage Rivers System
 - video
- 7:30 p.m. Images of the Grand
 - slide show by Chris Hart
- 8:00 p.m. Discussion
- 8:15 p.m. Coffee Break
 Displays
- 8:45 p.m. Planning for the Grand as a Canadian Heritage River
 - J. Gordon Nelson
- 9:15 p.m. Discussion
- 10:00 p.m. Adjournment

PUBLIC MEETINGS

Overall Summary of Surveys

Attendance; Reason for Attending

The majority of those attending the public meetings were affiliated with at least one interest group or organization in the area; this was a result of the large (approx. 2,500) targeted mailing list used to publicize this year's meetings. Most of those who attended came out of strong personal interest, and not necessarily as a representative of their organization. Representation from these organized interests was mixed; overall, attendance at the three meetings regularly included trail clubs, town/regional councils, and historical and heritage societies. The remainder of the representation included some educational institutions, consultants, a senior citizens' association, and others (see the Summary of Surveys by Meetings for a detailed list).

Who Should The GRHS Team Contact?

This question was poorly answered. The few suggestions came from the Cambridge meeting, and most of those were from one person. The poor response to this question may have been simply that people often can't think of lists on the spot. The suggestions that were made have been added to the mailing list.

Major Management Actors Currently Involved

A wide range of actors were listed as being involved in management in the Grand River basin. Many of these are what we would consider interest groups rather than actual management at the present time. The GRCA was mentioned most frequently, as well as the OMNR, OMOE, OMAF, and municipalities. For the most part, respondents cited only the type of agency rather than specific names of groups. Also identified frequently were trail associations, nature clubs, historical societies, sport groups (e.g. hunters and anglers clubs, canoeing clubs, etc.); there was also some mention of "farmers" and "fishermen".

Groups Who Should be Involved in Management

Most respondents just repeated the names or types of agencies as listed for the preceding question. The new suggestions included the Brantford Tourist Committee, the Federation of Ontario Naturalists, local citizens and landowners, planning departments, and a couple of puzzling mentions of the Department of Lands and Forests.

How Found Out About Meeting?

Of the five possible sources (mailings, newspapers, word of mouth, posters, the GRCA), the mailings and the newspapers were the most frequent sources. For the Caledonia meeting, the source was primarily the mailings; although an advertisement was placed in the local paper (the Grand River Sagem), it did not appear to have drawn many people, possibly because there had been no advance media coverage of the study. For the Cambridge and Fergus meetings, the newspapers were a major source, probably because of the advance coverage in addition to the advertisements placed in the local papers. The latter two meetings also had higher turnouts than the meeting in Caledonia.

PUBLIC MEETINGS

Summary of Surveys by Meetings

CALEDONIA - 15 responses; 18 present

1. Representing an Organization?

- 3 No
- 3 York Grand River Historical Society
- 1 Haldimand LACAC
- 1 Six Nations Land Research Office
- 1 GRCA
- 1 Brantford & Southern Railway regional/town councils
- 1 MTC
- 1 Clanbrassil College of Agriculture & Food (under construction)

2. Reason for Attending

- 9 personal interest
- 1 interest in increasing tourism
- 2 professional interest
- 1 reporting back to interest group
- 1 requested to attend
- 1 interested in restoration of canal system

3. Major Management Groups

- OMNR
- GRCA
- LACACs
- regional/municipal councils
- canoeing clubs
- Six Nations
- fishermen
- farmers
- Lower Grand Steering Committee
- Grand Valley Trails Association
- historical societies
- hunters & anglers clubs
- businesses

4. Groups Who Should be Involved (not mentioned above)

- Brantford Tourist Committee
- citizens
- more management from provincial bodies

5. How Found Out About Meeting

- 2 newspapers
- 7 mailings
- 1 word of mouth
- 1 GRCA

CAMBRIDGE - 22 responses; 33 present**1. Representing an Organization?**

- 4 No
- 2 Cambridge Seniors Centre
- 1 Cambridge Community Services
- 1 Cambridge Riverbank Committee
- 1 Ontario Society for Industrial Archeology
- 1 McCormick-Rankin
- 3 town councils
- 1 United Empire Loyalists
- 1 History of Navigation on the Grand
- 1 K-W Field Naturalists

2. Reason for Attending

- 9 personal interest
- 3 professional interest
- 1 landowner
- 7 information gathering for group members
- 1 wanted to tell us the background study was weak, not up-to-date
- 3 preserve wildlife
- 1 to gauge reaction to land offer suggestions
- 1 desire to see corridor planning become a reality

3. Who Should We Contact?

- Cambridge archivist
- Cambridge LACAC
- Cambridge Community Services
- Cambridge Director of Planning
- 2 property owners named
- Canadian Canal Society
- Ontario Society for Industrial Archaeology
- Prof. Paul Eagles

4. Who are the Major Actors

- OMNR
- GRCA
- OMOE
- OMAF
- LACACs
- CHRB
- Cambridge Riverbank Committee

Caledonia/York Historical Society
 municipalities
 Ancient Mariners
 canoe clubs
 U. of Guelph (Natural Heritage Stewardship Program)
 trail groups
 heritage societies

5. **Who Should be Involved?**

Dept. of Lands & Forests
 adjacent landowners; local citizens
 municipal advisory groups
 CHRB
 planning & development departments
 local historical societies
 FON
 an organization to work alongside the GRCA to provide info, be more objective & conservationist

6. **How Found Out About Meeting?**

8 newspaper
 1 council agenda
 2 GRCA
 8 mail
 2 posters
 1 word of mouth

FERGUS - 14 responses; 28 present

1. **Representing an Organization?**

2 No
 1 Guelph Trail Club
 2 Wellington County Historical Research Society
 2 County Board of Education
 2 town/regional councils

2. **Reason for Attending**

10 personal interest
 1 taking related course
 1 interest in industrial heritage
 2 educational interest
 1 property owner
 3 information gathering
 2 professional interest
 1 requested to participate
 1 interested in alternative water supply to Kitchener other than a dam

3. Who are the Major Actors?

OMNR
OMOE
OMAF
GRCA
municipalities
trail associations
heritage/historical societies
Trout Unlimited
local citizens
environmental action groups
nature groups
businesses
Yacht Club, Lake Belwood
tourists

4. How Found Out About Meeting?

5 newspaper
7 mail
1 poster
1 word of mouth
1 township council meeting

PUBLIC MEETINGS

Dialogue

CALEDONIA

- designate whole river, source to mouth
- would like to see restoration of historic sites, e.g. canal system
- Grand is a navigable waterway, why isn't there federal funding?
- great potential for economy with canal system
- residents don't know what goes on upriver, elsewhere; need more exchange of information
- little flow of information up & down valley
- strengthen Grand Valley hiking to increase awareness of valley

CAMBRIDGE

- how do you rationalize the distinction of nodes separate from sites like York, Indiana?
- should put forward whole river in accordance with stated desire to encourage people to think of river as a single community, as well as pointing out the special nodes
- agree/disagree--for immediate needs, better to go piece by piece, aim for long-term whole river designation
- how much of French River designated?
- designate all of river; is it the environmental significance alone or the whole package of features that make the Grand outstanding? would it be better to present, therefore, as a whole package rather than in pieces?
- from historical point of view, Grand deeded in payment of service to Indians; valley became open to trade & commerce; this itself makes the Grand a "heritage" river
- by not looking at the river as a package, how will that affect management as a CHR?
- what restrictions does designation have on riverbank property? tax rebates? will there be upgrading of water treatment facilities along river? can there be prohibition of development in woodland areas?
- someone bought riverfront property, intending to cut trees; is there someone he could contact for advice, recommendations?
- have all municipalities in valley indicated interest in increasing tourism?
- how define a tourist? how encourage tourism in basin?
- concern with how to control public involvement with respect to private ownership along river; if not bought as parkland, must have regulations because no public access right now, a lot of misuse of land, and increasing awareness through CHR program will aggravate problems with misuse (e.g. unruly campers, etc.), therefore landowners will want controls over nature of use of public land--OK with hikers, but not bikers

FERGUS

- whole river should be designated, otherwise will have problem with contamination of some areas
- aware of Maple Leaf Acres (town), Speed River--no sewage disposal for 2200 people; also seasonal camp, sandy ground, Maple Leaf is clay & drains to wetlands, therefore would like to see all of GR designated, since would affect water quality throughout valley
- all of us probably have own motives for attending this meeting--most here are concerned with water quality

- wouldn't designation of only 3 areas focus attention to just those areas, rather than to river as a whole?
- why not also consider Gorge as a node?
- everyone is keen on a part of the river, therefore should designate the whole river
- why not designate areas threatened by development?
- why would entire river be rejected, as opposed to the nodes?
- is it possible to avoid the ultimate confrontation? have a serious problem controlling water pollution
- [RMW, cautions GR as CHR because of constraints that may be placed on development, therefore will lose political support for designation of river as a whole]
- people are missing the biggest point--pollution is from agricultural lands--97% of water pollution
- at what point do we reach a compromise? when do politicians become leaders rather than followers? how do we pressure politicians that constraints are beneficial in the long term? too early now to talk compromise
- politicians could become heroes for improving GR--Rhine example
- what does designation mean? implications of implementation of management plan? what is the cost to taxpayers for these studies? how much will it cost after designation?
- would I be able still to spread liquid manure? extract gravel? construct developments?
- in favour of the nodes as the most important segments of whole river designation
- isn't this all redundant? management already being done by existing agencies
- CHR designation could enhance identity of GR in eyes of public--recent household survey showed that most people are interested in GR at least for recreation
- have we explored Ministry of Education secondary schools for course of study?
- if proposal accepted, how much money will GR get?
- GRCA appears to be logical lead agency

Public Meeting Agenda

November 13, 1989

1989 GRAND RIVER HERITAGE STUDY

Open House

Agenda

- | | |
|-----------|---|
| 7:00 p.m. | The Canadian Heritage Rivers System - video
The Grand River Valley - slide presentation
Introduction: Outline of Research |
| 8:00 p.m. | COFFEE BREAK |
| 8:30 p.m. | Presentation of Proposed Plan and
Nomination Document
Open Discussion |

Responses to the 1989 Grand River Heritage Study

NOMINATION AND PLANNING DOCUMENTS

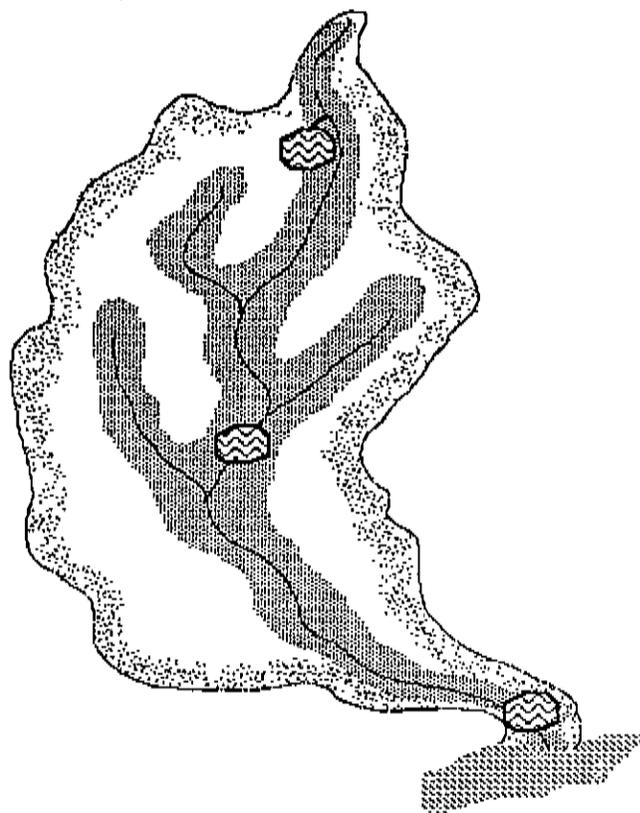
Public Meeting, November 13, 1989

<i>Attendance:</i>	Approximately 80
<i>Respondents to Inquiries:</i>	29 (note that not all respondents answered all questions.) Response rate approximately 36%
<i>Support for the Designation</i>	The majority of the respondents supported the designation
<i>In favour:</i>	28
<i>Opposed:</i>	0
<i>N/R:</i>	1
<i>Support for the Draft Plan</i>	The majority of the respondents supported the draft plan presented for their review at this meeting.
<i>In favour:</i>	26
<i>Against:</i>	2
<i>N/R:</i>	1
<i>Concerns About the Current Proposal</i>	The major concerns with the current proposal were: <ul style="list-style-type: none"> - area to be nominated - 7 indicated preference for nominating all of the main stem - 5 indicated preference for nominating inclusion of tributaries - 4 indicated concern for possible conflicts with development - 3 indicated interest in the proposed management system for implementation--e.g. master plan, role of the GRCA, public committee(s), regulations - 1 expressed concern for the role- or lack thereof - of the Six Nations Reserve - 3 expressed interest in the "opt-in" clause for later expansion of the designated boundaries - 3 expressed concern for the protection of water quality - 5 indicated support for further public meetings to report on progress, as well as other means of communicating with the public
<i>Media Coverage:</i>	Media coverage was known to be given by at least the following: Guelph Mercury Paris Star CKCO-TV Kitchener-Waterloo Record

APPENDIX B

June 1989 Public Documents

An Opportunity to
Participate
in



Planning for the Grand as a Canadian Heritage River

Heritage Resources Centre
University of Waterloo

June 1, 1989

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Planning for the Grand as a Canadian Heritage River

An Opportunity to Participate

The Outstanding Heritage Resources of the Grand River

This statement is intended to encourage public response to the idea of planning for the Grand as a Canadian Heritage River (CHR). A 1988 background study undertaken by the University of Waterloo Heritage Resources Centre for the Canadian Heritage Rivers Board (CHRB) and the Grand River Conservation Authority (GRCA) demonstrates that the Grand River Valley has many remarkable natural and cultural heritage features. The valley has rolling pond and wetland pitted hills or moraines and other glacial or geological features. The valley also has unusual plants and animals. It also has old mills, archaeological and other human artifacts as well as excellent boating, hiking, and other recreation and tourism opportunities.

Much of this natural and human heritage and some recreation and tourism opportunities are outstanding on a provincial or national basis. This heritage and these opportunities are uncommon in Ontario or Canada, or they are representative of aspects of our natural and human history which have been recognized as provincially or nationally significant by authorities such as the National Historic Sites and Monuments Board or the Ontario Ministry of Natural Resources.

Examples in this regard are the giant potholes worn in bedrock at Rockwood east of Guelph; the Carolinian forests at Spottiswood Lakes or other sites along the Grand south of Cambridge; the Pauline Johnson estate south of Brantford on the Six Nations Reserve; and the old riverboat canal locks set amid the

floodplains and extensive wetlands in the southern part of the valley near Dunnville and Lake Erie.

Details on such features are presented in the background study compiled by the University of Waterloo Heritage Resources Centre study team. Summaries of the findings on natural and human heritage and on recreation and tourism are also included as Appendix I of this paper.

Although all natural and human heritage resources and recreation and tourism opportunities in the valley and, indeed, the entire watershed are of interest, the outstanding heritage features, processes and opportunities to be discussed later are especially valued because they can provide the basis for designating the Grand as a Canadian Heritage River. As such the Grand would join a small number of famous Canadian streams including the Alsek in the Yukon, the Clearwater in northern Saskatchewan, the French in Ontario and the St. Croix along the New Brunswick-Maine border.

The Values of Canadian Heritage River Status

What, it may be asked, are the values of Canadian Heritage River (CHR) status? The first is that the designation would increase *public awareness* and appreciation of the recreation and tourism potential of the river and its valley. In the case of the Grand, over the years many communities and groups have forgotten or neglected the heritage side of the stream, thinking of it and using it for water supply and other development purposes. At Open Houses held as part of the 1988 Canadian Heritage River background study, a number of people expressed support for stronger efforts to protect what was seen as the insufficiently appreciated natural and human heritage of the Grand, especially at a time when accelerated development in parts of the valley

seems to be threatening valued things which have come to us from the past.

Another value of the Canadian Heritage River designation is *economic*. Designation would not only make local people more aware of heritage values and the need to use and protect them appropriately, but it would also increase knowledge of the Grand in other places. This would help to attract more visitors to the Grand River watershed. In this respect some people are concerned that the *recreation, tourism and associated economic potential* of the river is not being adequately developed, for example in regard to boating and related activities in the lower river from Brantford to Lake Erie.

Another major value of Canadian Heritage River status is *educational*. Reports and other information prepared for heritage river planning and management purposes can be used in the schools, colleges and universities as well as by interested citizens' groups. The information can become part of the *environmental education* program of key agencies such as the GRCA. Designation can also encourage *further learning or research*, for example studies of climatic or other environmental changes which can influence the use of the river in future.

Another prime value of CHR designation for the Grand is the *increase in enjoyment and quality of life* that it can bring. Outstanding natural and human heritage sites will be better known, more widely used, and the citizens better informed. The recreation and leisure time of citizens will be enriched.

Designation of the Grand as a Canadian Heritage River can also promote *more co-operation among people and agencies* throughout the watershed. Designation can prompt local governments to work more closely with citizens' groups, the GRCA and federal and provincial government agencies as well as private businesses and relevant foundations such as the Waterloo

Regional Heritage Foundation, in planning for appropriate use and protection of heritage resources along the river valley. Some of this co-operation has been going on for years, for example for flood control and related purposes. But it can and should be more vigorously extended to include other aspects of environment and economy, including heritage.

The Watershed and Corridor Studies

In regard to the foregoing comments, it is noteworthy that since the beginning of the Canadian Heritage River background studies in April 1988, two other studies have been advanced which are closely related to the Canadian Heritage River studies for the Grand. The first of these other studies is a review of the GRCA 1983 Interim Resource Management Plan which lays out policies and guidelines for the Authority's floodplain, conservation and other direct responsibilities as well as its co-ordination programs for wildlife, water supply, recreation and other activities in the watershed.

The intent of the Resource Management Study is to "provide a broader, more comprehensive guide for resources planning within the entire valley supported by the Grand River Conservation Authority, resource agencies, municipalities and private landowners."

The second set of related studies are termed corridor studies. One is currently being undertaken by the municipalities of Kitchener, Waterloo, Cambridge, the township of Woolwich and the Waterloo Regional Government. The main objective of a corridor study is to "develop a planning framework for incorporating planning open space considerations as factors in development and redevelopment proposals as well as public land acquisition along the Grand River." The current corridor study

extends from the north boundary of the township of Woolwich to the south boundary of the township of North Dumfries.

In brief, the watershed Resource Management Study sets a broad context for heritage planning. The corridor studies serve as a means of linking heritage planning along the river, for example in the case of the outstanding heritage areas to be discussed shortly.

The Nomination Document and Canadian Heritage River Plan for the Grand

To attain Canadian Heritage River status for the Grand two other steps are necessary beyond the preparation of the 1988 background study of the heritage resources in the valley. The first of these is the preparation of a nomination document which highlights the natural and human heritage resources and recreational opportunities for consideration by the Canadian Heritage Rivers Board in determining whether the Grand should receive CHR status. The report lays stress on the quality of the valley resources as well as the issues that need to be addressed to protect and use these resources appropriately in future. A draft nomination document for the Grand is to be prepared by mid-October and submitted to the CHR Board in January.

The second report is a more detailed plan or strategy for a Canadian Heritage River program on the Grand River. The 1988 background study showed that many natural and cultural heritage planning and management policies and practices are already in place in federal, provincial, regional and local governments in the watershed. Examples are Woodside National Historic Park, Kitchener; the wetlands policies of the Ontario Ministry of Natural Resources (OMNR); and the historic building and Environmentally Significant Area (ESA) policies of the Waterloo and Haldimand-Norfolk Regions. The GRCA has many

programs relevant to heritage, notably in regard to floodplain regulation and use and the acquisition and management of conservation lands in the valley. As an example, the Luther Marsh area in the upper valley has largely been developed through GRCA programs, and the agency owns considerable land there which is basically managed for flood control, water supply and recreation purposes.

Not all areas in the Grand River Valley are managed according to the same policies, however. That part of the valley between Cambridge and Paris which falls under the jurisdiction of the Regional Municipality of Waterloo is subject to its ESA policies and a number of ESAs have been established there. That part of the Cambridge - Paris area which lies in Brant County is not covered by an ESA policy and no such areas have been designated there. These and other questions relating to the effectiveness of current heritage management arrangements in the Grand River Valley should be addressed in the planning study.

Some Basic Planning Ideas for the Grand as a Canadian Heritage River

In order to prompt citizen reaction to planning for Grand River heritage, a set of basic ideas have been developed for discussion in Open Houses and other meetings to be organized by the University of Waterloo Heritage Resources Centre as part of the 1989 Grand River Heritage program. The program once again is jointly sponsored by the CHRB and the GRCA with the general support and advice of the Ontario Ministry of Natural Resources, the agency representing Ontario on the CHRB. A Steering Committee consisting of representation from these support groups also is again guiding the Grand River Heritage program.

It is important to recognize that the planning ideas that we are putting forward are only suggestions intended to prompt

reaction and advice from interested persons and groups. They are a means to get people's views, although they are built upon potentially useful opinions or recommendations which have been made to us up to this date in our work. The ideas or suggestions are put forward in the form of questions, with some possible answers or responses. Readers are invited to comment on these questions and possible responses and to add any other suggestions of their own.

Information given to us by readers will be used in preparing a proposed plan. This Canadian Heritage River plan for the Grand will be presented in draft form at one or more public meetings in Fall, 1989. Subsequently it will be submitted to the GRCA, other concerned government agencies, and to the CHRB in January, 1990.

(1) What part of the Grand River Watershed should be designated for CHR purposes?

The CHR guidelines indicate that CHR status can be given to all or part of the valley lands along a candidate river. The guidelines also indicate that designation can be given if the valley lands are considered to be outstanding on at least one of natural, human or recreational grounds. In the case of the Grand we suggest that the designation be based on the recognition that *three parts of the valley, the Luther Marsh and the Cambridge - Paris and Dunnville areas, contain outstanding combinations of biological and human heritage features and related recreation opportunities.* Some reasons are given briefly below.

Briefly put, the Luther Marsh area contains extensive provincial Class I and Class II wetlands, high bird and other animal diversity, and excellent hunting and naturalist recreation opportunities. The area is also an important part of the flood control and low flow augmentation system in the Grand.

The Cambridge - Paris area is outstanding for its recessional moraines, tills, ponds and potholes and other glacial features, for its bird and wildlife diversity, for its large extent of "Carolinian" forest, for its free-flowing character over a reach of some 20 kilometres, for its old mills, and its hiking and other naturalist recreation opportunities.

The Dunnville area is remarkable for its extensive Class I and Class II wetlands, its old riverboat locks, feeder canals, and other representations of the nineteenth century navigation system on the Grand, as well as for its fishing, boating and other recreation opportunities.

A fourth possible area which could be considered outstanding is the Elora gorge area. While not as noteworthy biologically as the three areas noted above, the Elora gorge area does have exceptional land forms and many recreation and tourism programs and opportunities. It also is of high interest historically, for example its old mills and industrial history.

Response to the foregoing suggestions and recommendations on other areas considered to be outstanding are welcome.

COMMENTS

(2) How can a management boundary be drawn around the outstanding heritage areas?

This is not an easy task. Natural and human processes are usually continuous and it is difficult to draw boundaries that clearly separate them. For example, wildlife can move from area to area, and recreation and other land uses do as well. One type of boundary that tends to be more convincing than others is a water divide, from which rivers and waters flow in different directions. The boundary around outstanding Grand River heritage areas could therefore be drawn to conform to the watershed divides from which waters flow into surrounding lands. The drawing of such boundaries has not been attempted or tested yet in this planning study and may be complicated by such things as unknown groundwater flows. Differences in land use or in vegetation cover or other elements of landscape or environment should also be considered as possible means of delimiting boundaries.

COMMENTS

- (3) **How can water quality, wildlife movements, vegetation, erosion and deposition, land use changes and other processes be managed along the main stem and principal tributaries of the Grand in order to prevent adverse effects on the outstanding heritage areas?**

Water quality has been improved in the Grand River watershed generally during the last several decades through the co-operative efforts of municipalities, provincial agencies and the GRCA. Current water quality is not considered to be high enough to merit CHR designation in its own right. But the water quality is considered to be high enough to support the vegetation, wildlife, historic and other heritage resources and recreation opportunities upon which CHR designation is based for the Grand River Valley.

The government agencies primarily responsible for the current good to very good quality of river water will have to take measures to maintain or enhance water quality above the points where the Grand enters the outstanding heritage areas, as well as the waters within these areas. Agriculture and other non-point sources of sedimentation and pollution pose special problems in this regard, as do new or expanded industrial and residential developments near the outstanding areas or on water bodies leading into them.

More information needs to be collected on the character and distribution of vegetation, wildlife and other key natural features and processes in and around the outstanding areas. The same is true for key human features and processes. Causal relationships among the natural and human features and processes also need further study. Historic studies should help us to understand the evolution of key natural and human features and processes as well as landscape trends and future issues for planners and managers. The information derived from these studies will of course also be

helpful in formal and informal learning and in interpretation programs.

Basically, the integrity of the outstanding heritage areas rests on understanding and careful management of vegetation, wildlife, land use and other patterns within and close to them, and ultimately on maintenance and possible enhancement of water quality generally. In this sense the outstanding areas serve as general guides or indicators of heritage management and of environmental health in the entire Grand River basin. For these basic reasons environmental assessments are desirable for proposed land use changes which may alter in unwanted ways the water quality and other key features and processes in the outstanding Grand River Valley heritage areas. Such assessment procedures are currently in place for ESAs in the Waterloo Region.

COMMENTS

- (4) How can planning and management of the outstanding heritage areas be linked effectively with heritage, land use and conservation planning and management in the watershed as a whole?

Suggestions in this regard have been made previously, notably that more needs to be known about how effectively or how well existing heritage planning and management arrangements do provide for conservation and for appropriate resource use. Aside from careful planning and management of these outstanding areas themselves, their well-being rests on careful use and conservation of the floodplain and valleylands and of the watershed generally.

The corridor studies mentioned previously should provide for conservation and careful use of floodplain and valley lands, especially when linked to existing management systems in the municipalities as well as provincial government agencies and the GRCA. It is desirable therefore that corridor studies be completed for all major reaches of the Grand and its tributaries through the co-operative efforts of the municipalities and the GRCA.

To improve overall basin planning and management both the Grand River Heritage study and the corridor studies should find a place in the Grand River watershed plan currently being reviewed by the authority. This plan or strategy should provide a comprehensive framework into which can be set the flood control, conservation and other direct responsibilities of the GRCA as well as its management, recreation and co-ordinating functions, for example in regard to vegetation management, water supply and heritage. The CHR and corridor studies should therefore be integrated with the GRCA watershed review. It is important that these linkages be made so that development and conservation strategies and activities in the river valley and the basin are in tune with one another.

In this regard the underlying philosophy of heritage, corridor and basin planning might be the emerging concept of *sustainable development*. The road to sustainable development in the Grand River basin might be through a watershed resources management plan that is in the form of what has recently been called a *conservation strategy*. Such a strategy aims to provide for conservation and appropriate use. The strategy also involves identification of major development and conservation issues in an area, selection of means to address and hopefully solve these issues through zoning and other land use planning, special areas designations, improved regulations, economic and other incentives, environmental appraisals, improved resource inventories, improved staff training and other methods.

A fundamental element in conservation strategies is *co-operation and co-ordination across sectors* such as heritage, recreation and tourism, water, forestry, soils and agriculture. The intent basically is to avoid unwanted duplication, gaps and other problems in what should be a comprehensive, interrelated approach to use and conservation.

COMMENTS

- (5) **How can recreation and tourism opportunities in the outstanding heritage areas be more fully developed without unwanted impact on key natural and human heritage resources in these areas?**

The 1988 background study showed that the recreation and tourism data for the Grand River basin are out of date. The last baseline information was completed in 1978 and more current data are needed to understand what recreation and tourism facilities are available, where they are located, what their prospects are, what effects they have had and are likely to have on valued heritage resources, and how they can be further developed on a sustainable basis. A study along the foregoing lines will be part of the CHR program for 1989. This study will also attempt to address some of the barriers to access to Grand River heritage and recreation by physically challenged persons, including the increasingly large segment of our population which is in the golden years.

COMMENTS

- (6) How can the outstanding heritage areas and the other heritage resources in the basin be monitored to ensure sound management?

A number of measures seem to be needed in this regard, as information and communication systems currently may not be seen as serving heritage agencies or the public as well as they might. The generation of good quality information on programs, activities and effects is a major need in complex situations like that in the Grand where many agencies, groups and individuals are acting in diverse and sometimes contradictory ways.

The first measure to be considered is the possible development of *a more comprehensive network of observation points or monitoring sites* in the Grand River Valley and indeed the entire basin. Indicators of the condition of natural and human heritage and of recreation sites need to be considered, especially for the outstanding Grand River heritage areas. These indicators could cover not only water quality and water regime but vegetation cover, wildlife populations, historic buildings and other important landscape features.

Information on the outstanding areas and on the river corridor could be computerized and placed into a *Geographical Information System* (GIS). This GIS could be updated at least biannually.

GIS and other information could be included annually in a *Grand River Heritage Report*. This report could be co-ordinated by the GRCA and involve input from all municipalities and regional, provincial and federal government agencies in the basin.

A heritage co-ordinator could be appointed by the GRCA to plan and administer the foregoing arrangements with the advice

of a *Grand River Heritage Steering Committee representative of appropriate interests in the watershed*. The Committee could meet at least twice annually to plan the yearly Grand River Heritage Report, consider responses from the public and make recommendations to responsible agencies and groups.

COMMENTS

- (7) **How can public interest and support be secured for the proper management of the outstanding heritage areas as well as heritage use and conservation generally in the Grand River basin?**

The previously mentioned measures intended to improve co-ordination and overall heritage management will help address this question; however other measures are needed as well. Many of the lands in the Grand River valley are privately owned, more so in some areas than others. For example, private ownership seems more prevalent in the Cambridge - Paris area than in the Luther Marsh area. More information is needed on both private and public ownership patterns as a basis for planning. Knowledge of private ownership patterns can assist in the development of *landowner contact and private stewardship programs* like those being undertaken for the protection and appropriate use of Carolinian forest lands by the University of Guelph with the support of the Ontario Natural Heritage League and other bodies.

Small *interpretive booklets* could be prepared at least for the outstanding heritage areas; examples are the booklets and guides prepared for some wild and scenic river programs in the U.S. These booklets could be well-illustrated and written and prepared in a fashion useful for the schools and the general public. *Videos and other materials* could also be developed to illustrate visually the outstanding aspects of Grand River heritage, the issues involved in management, and the need for ideas, co-ordination and participation.

The formation of a *Grand River Heritage Forum*, a citizens' group devoted to promoting careful use and conservation of the river valley and its heritage, could be encouraged by the GRCA and other key agencies and groups.

The Grand River Valley Trails Association and other *trail groups* could be encouraged to take a strong role in planning, because the use of trails provides a major means of linking people and places all along the valley. *Linear recreation experiences* could be encouraged, for example rallies or marathons.

COMMENTS

- (8) How can the Six Nations and New Credit Reserves and the interests of the native people be built more equitably and effectively into heritage planning and management for the Grand River Valley?

Initially the native people entered into discussions with the Heritage Resources Centre regarding the 1988 background study of the Grand. However they later withdrew, while asking to be kept informed, largely because they are interested in settling "land disputes" along the river near the reserve before entering into co-operative heritage programs along the Grand. The GRCA and other local and regional governments should work with the provincial and federal governments to *find a means of settling these disputes* as soon as possible in order that all valley residents can participate effectively in river valley planning for the Grand.

The Six Nations/New Credit Reserve contains many outstanding natural and human resources, and a human history of unusual value for heritage purposes. As the 1988 background study showed, native people have lived in the Grand River Valley area for thousands of years and they continue to work to gain a rewarding and more independent role in this area. *Equity* is an important part of the concept of sustainable development and it should be striven for in this case.

COMMENTS

A Request for Response

As indicated earlier, the foregoing questions and responses are intended to provide the basis for thought and the presentation of ideas and opinions by citizens and groups interested in Grand River heritage and its economic, social, educational and environmental role in the valley and the watershed in future. We very much hope you will respond and give us your ideas and views. In doing so you may wish to present questions or concerns which we have not addressed. We welcome this and other suggestions in regard to Canadian Heritage River status and related planning and management of the Grand.

COMMENTS

Gordon Nelson
Heritage Resources Centre
June 1, 1989

Appendix I

1.0 NATURAL HERITAGE

1.1 Geological

In the natural sense the Grand River is outstanding both geologically and biologically. The river is one of the oldest in Ontario, underlain by buried river valleys probably carved thousands of years ago, during the last glacial stage. The present river and its valley began with the retreat of Wisconsinan ice some 12,000 years before the present (B.P.). Along the course of the river valley are found good examples of the major landforms resulting from glaciation. These include: extensive poorly sorted clay, sand and gravel deposits or till and undulating fields of ground moraine in the north; hummocky interlocking, recessional or retreat moraines in the central basin; and old raised glacial shorelines and flat lake bottom deposits in the south. In other words, along the Grand River Valley is the sequence or suite of landforms and deposits representing much of the evidence for ancient ice advance and retreat.

Within the Grand River Valley are also found quite rare geologic features such as the giant potholes and old river channels at Rockwood and the canyons of the Elora Gorge. Unusually large aquifers or underground water storage areas are also located in the central part of the Grand River Valley area. Such aquifers have been the basis for long time reliance upon groundwater for water supply in many communities in the Grand River basin.

1.2 Biological

From a biological standpoint many rare plants and other unique features are found in various parts of the Grand River

Valley area. A truly outstanding biological feature is the extensive Grand River forest in the central and lower part of the valley below Cambridge. This forest or natural system contains many Carolinian species which occur in Canada only in the most southerly part of Ontario, roughly below a line drawn from Windsor to Toronto. The Carolinian flora include for example, tulip tree, sassafras, flowering dogwood and various species of hickory. Rare animals such as the opossum and birds such as the prothonotary warbler also are concentrated in the Carolinian zone.

Extensive areas of Carolinian forest are found in and around that part of the valley below Cambridge and also on the Six Nations and New Credit Indian Reserves. An almost unbroken 20 kilometre stretch of this forest lies between Cambridge and Paris.

This stretch of Carolinian forest is not only one of the strongest cases for Canadian Heritage River status but also the key element in an uneven network of forest, woodlots and treed strings and patches that link with the Grand River, providing important habitat for the movement and survival of animal life.

The Grand River valley also contains numerous provincially significant marshes and wetland areas. Luther Marsh in the northern part of the valley is also outstanding biologically, for example with respect to its very high number of breeding bird species, and its diversity generally. The Dunnville and Grand River wetlands in the lower valley near Lake Erie are also of special interest.

2.0 HUMAN HERITAGE

2.1 The Cultural Mosaic

In human terms the Grand River Valley is outstanding for its ethnic or cultural mosaic. It contains features and landscapes which reflect the attitudes, values and effects of a wide variety of people, some of whom are still distinctive in the valley today. In the north are descendants of Scots and Irish immigrants. This includes many Scots in towns such as Guelph whose presence represents some of the major means of European settlement in Canada, i.e. the land company, in this case the Canada Land Company and the entrepreneurs who purchased land blocks from it for sale to immigrants. In the central basin are Mennonites as well as descendants of German immigrants of various religious backgrounds. In the lower basin below Paris are descendants of United Empire Loyalists, including the native people who came from New York in the 1780s after the American Revolutionary War.

2.2 The Native People

The valley is especially outstanding for the story it tells of the history and current role of native people. Archaeological research in the Grand River area has revealed sites and artifacts that date back thousands of years. Remains of Paleo-Indian people who hunted mastodon, bison and other Pleistocene or Ice Age fauna in southern Ontario some 9,000 to 5,000 years B.P. are concentrated in the lower valley below Paris. Remains of Archaic and other people who occupied the valley area some 5,000 to 1,000 years B.P. are also found in the lower and central valley in particular.

Remains of later Woodland peoples who practised shifting agriculture based on corn, beans and squash, date from about the time of Christ to about 1100 AD. These people lived in transient

villages which have been found primarily in the central valley area. These ancient folk are linked to the native people who live today on the Six Nations and New Credit Reserves along the west bank of the Grand south of Brantford. On the New Credit Reserve are descendants of the Mississauga Indians who succeeded the Neutrals, or late Woodland residents of the area.

The Six Nations and New Credit Reserves are also home to descendants of Iroquois from New York who were awarded land all along the Grand River by the British government for their loyalty in the American War of Independence. These people subsequently migrated to Canada where they were led for many years by the well-known Joseph Brant. The history of their interactions with European and American immigrants and the gradual reduction of their reserve is a prominent example of an important theme in Canadian history. The Six Nations - New Credit area represents an unusual manifestation of Indian history and the continuity of the struggle to do well economically, culturally and environmentally today.

2.3 Industrial History

Another outstanding aspect of human heritage in the Grand River Valley is its industrial history. As the detailed analysis in the report on human heritage shows, numerous old mills and other historic structures are located along the Grand River, with many of them still being used today as factories, markets or restaurants, for example in Guelph and Cambridge. A number of major technological innovations were made at historic sites along the valley as well. Examples are the invention of a rolling mill for grinding grain at St. Jacobs, and Alexander Graham Bell's well-known invention of the telephone in Brantford. His house is preserved as a historic site on the Grand River bank in the southern part of the city. Other examples of industrial history include development of a canal system from Dunnville via Cayuga to Brantford in the period from about 1830 to the 1860s.

Paddlewheelers and other craft passed along the Grand and its locks moving passengers, wheat and other goods to and from United States ports and other Canadian cities. Access to these other cities was facilitated by early nineteenth century construction of a feeder canal between the lower Grand, Lake Erie, Dunnville area and the Welland Canal, St. Catharines, Hamilton and other nearby towns.

Remains of the Grand River locks and the Welland feeder canal are quite apparent today. The tourism potential for such industrial history seems good, especially if the interest of lower Grand River people in arranging for construction of a new lock and the development of boating and other tourism activities between Dunnville, Caledonia and points north comes to fruition. Major efforts are being made to develop tourism and associated facilities relating to industrial and other history in river towns such as Dunnville, Caledonia and Brantford.

3.0 RECREATION AND TOURISM

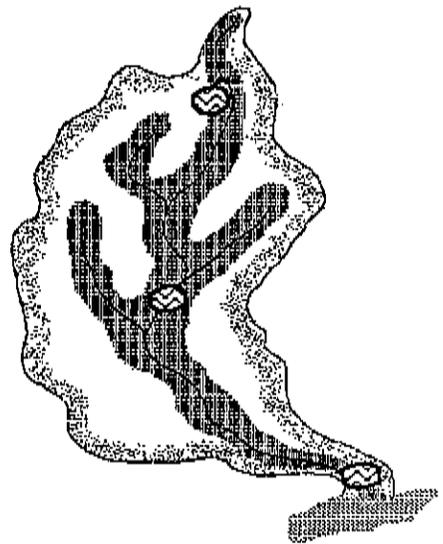
In terms of recreation and tourism, the Grand River valley offers many resources, facilities and opportunities. Some of these have just been discussed in the foregoing section on industrial history. Many others are described in the report on recreation in *The Grand as a Canadian Heritage River*. Continuing use and protection of these resources, facilities and opportunities should contribute to tourism as well as to recreation and quality of life not only in the basin but through tourist visits from large surrounding areas.

From the perspective of the case for the Grand as a Canadian Heritage River, three areas are considered to possess a combination of recreational opportunities and related natural values which are highly significant for naturalist activities, i.e. for wildlife viewing, hiking, fishing, and other outdoor activities.

These three areas are the Luther Marsh in the upper reaches of the river, the Carolinian forest area in the central part of the basin, perhaps extending to include the Six Nations and New Credit Reserves, and the wetlands and marshes near Dunnville and Port Maitland at the mouth of the Grand. In addition, four areas have been identified as having highly significant clusters or combinations of recreational opportunities, including human heritage appreciation. These are Fergus/Elora/West Montrose, Elmira/St. Jacobs, Kitchener/Waterloo, and Brantford and area.

REFERENCE

Nelson, J.G. and Pauline O'Neill (eds.), 1989. *The Grand as a Canadian Heritage River*. Occasional Paper 9, Heritage Resources Centre, University of Waterloo, Waterloo, Ontario.



CANADIAN HERITAGE RIVERS

The Case of the Grand River, Ontario

University of Waterloo
Heritage Resources Centre
Waterloo, Ontario
N2L 3G1

May, 1989

Canadian Heritage Rivers

The Case of the Grand River, Ontario

J. G. Nelson

ABSTRACT

Rivers are part of the Canadian image. In recent decades many have been polluted or changed in unwanted ways by rapid economic development. In an effort to provide for appropriate use and protection of significant streams the federal and some provincial and territorial governments have co-operated in a Canadian heritage river program. Three steps are involved in making a river part of this system. The first is the preparation of a background study to determine whether a river has the outstanding natural, human, or recreational resources to qualify. The second is to prepare a nomination document showing how the key resources can be protected while in appropriate use. The third is completion of a river management plan. A Grand River background study has been completed and a study team has concluded that the River merits Canadian heritage river status on natural, human, and recreational grounds. Some important issues are also identified for attention in a nomination document and the management plan. These issues include: management effectiveness, co-ordination among public and private interests, and the concerns of native people in the southern Grand River watershed.

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Canadian Heritage Rivers

The Case of the Grand River, Ontario

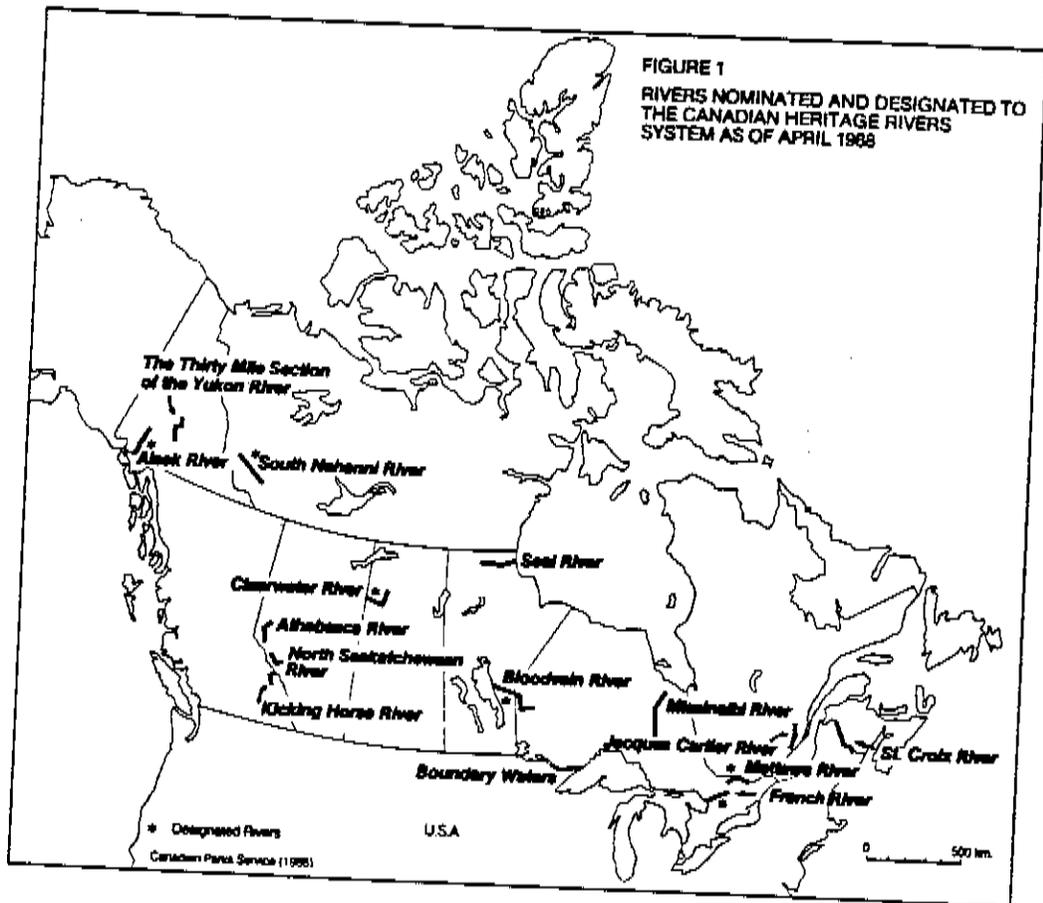
J. G. Nelson

INTRODUCTION

Rivers are part of the Canadian image. In recent decades many have been polluted or changed in unwanted ways by rapid economic development. In an effort to provide for appropriate use and protection of significant streams the federal and some provincial and territorial governments have co-operated in a Canadian Heritage River (CHR) program (Figure 1). Three steps are involved in making a river part of this system. The first is the preparation of a background study or inventory to determine whether a river has the outstanding natural, human, or recreational resources to qualify. The second is to prepare a nomination document showing how the key resources can be protected while in appropriate use. The third is completion of a river management plan.

A Grand River background study has been completed in which it is concluded that the river merits Canadian Heritage River status on natural, human, and recreational grounds. Some important issues have been also identified for attention in a nomination document and the management plan.

At the outset it should be noted that the Grand has been found to be outstanding on at least two other occasions. It was one of eleven rivers considered worthy of Canadian Heritage River status among one hundred and eleven rivers examined in a recent system study of all major streams in Ontario (Cathexis Associates, 1987). Hugh MacLennan, the well-known author of *Two Solitudes*, also concluded that the Grand was a very special stream along with the Ottawa, Saguenay, the Saskatchewan and other famous Canadian rivers.



RESULTS OF BACKGROUND STUDY OR INVENTORY

The recently completed background study reveals the Grand River as being rich in natural and human heritage as well as in recreation and tourism opportunities. Much of the heritage and some recreation and tourism opportunities are outstanding on a provincial or national basis. This heritage and these opportunities are rare in Ontario or Canada or they are representative of aspects of our natural and human history which have been recognized as provincially or nationally significant by authorities such as the National Historic Sites and Monuments Board or by the Ontario Ministry of Natural Resources.

Examples in this regard are: the Pauline Johnson estate south of Brantford on the Six Nations Indian Reserve; the giant potholes worn in bedrock at Rockwood east of Guelph; or the Carolinian species in the Grand River forest south of Cambridge. Details on such features are presented in the background study report recently published by the Heritage Resources Centre, University of Waterloo (Nelson and O'Neill (eds.), 1989). A summary of the findings on natural and human heritage and on recreation and tourism is presented below.

NATURAL HERITAGE

Geological

In the natural sense the Grand River is outstanding both geologically and biologically. The river is one of the oldest in Ontario, underlain by buried river valleys probably carved thousands of years ago, during the last glacial stage. The present river and its valley began with the retreat of Wisconsinan ice some 12,000 years before the present (B.P.). Along the course of the river valley are found good examples of the major landforms resulting from glaciation. These include: extensive poorly sorted clay, sand and gravel deposits or till and undulating fields of ground moraine in the north; rolling interlobate, recessional or retreat moraines in the central basin; and old

raised glacial shorelines and flat lake bottom deposits in the south. In other words, along the Grand River Valley is a sequence of landforms and deposits representing much of the evidence for ancient ice advance and retreat.

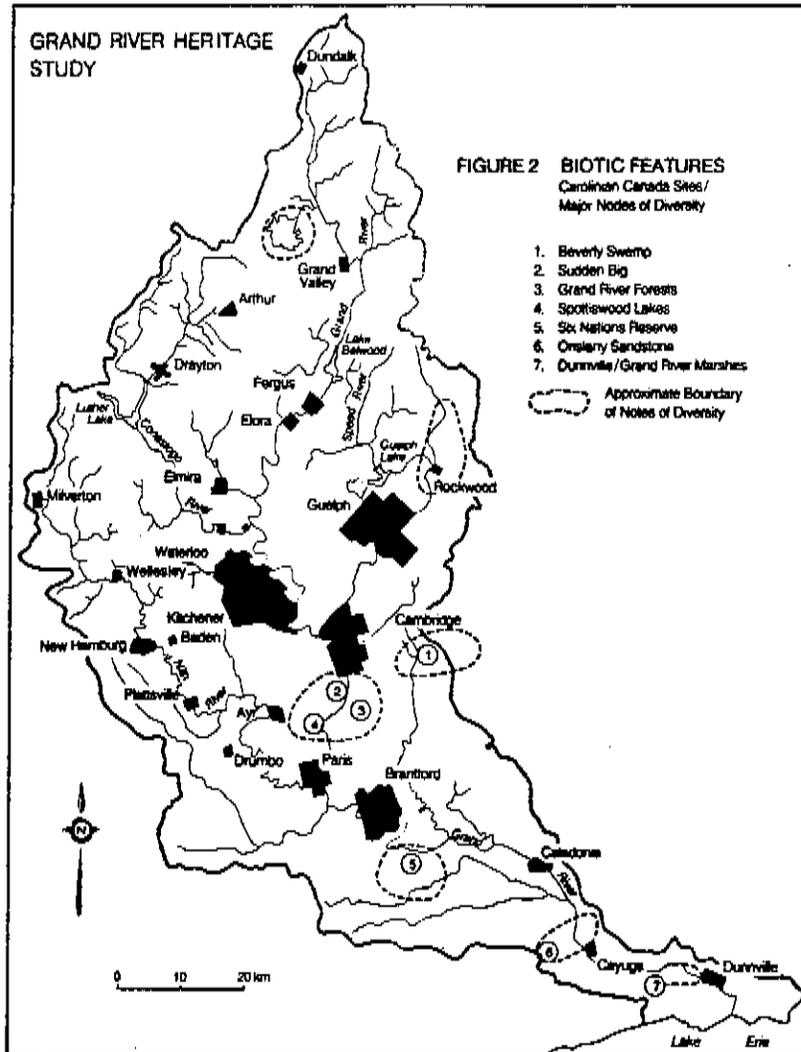
Within the Grand River Valley are also found rare geologic features such as the canyons of the Elora Gorge. Unusually large aquifers or underground water storage areas are also located in the central part of the Grand River Valley area. Such aquifers have been the basis for long time reliance upon groundwater for water supply in many communities in the Grand River basin.

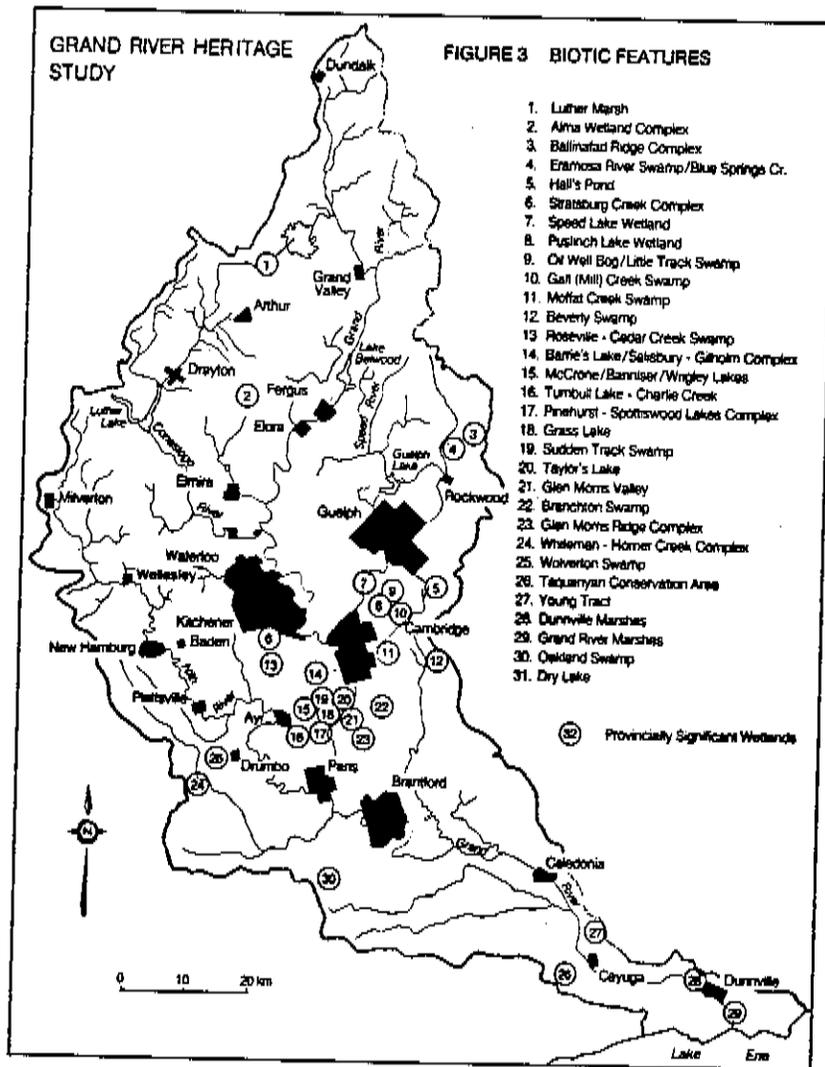
Biological

From a biological standpoint many rare plants and other special features are found in various parts of the Grand River Valley area (Figures 2 and 3). A truly outstanding biological feature is the almost unbroken 20 kilometre stretch of forest in the central and lower part of the valley below Cambridge. The Carolinian species in this forest occur in Canada only in the most southerly part of Ontario, roughly below a line drawn from Windsor to Toronto. These species include for example, tulip trees, sassafras, flowering dogwood and various species of hickory. Rare animals such as the opossum and birds such as the prothonotary warbler also are concentrated in the Carolinian zone. Extensive areas of Carolinian forest are also found on the Six Nations/New Credit Indian reserves further south on the Grand, below Brantford.

These Grand River forests are not only one of the strongest cases for Canadian Heritage River status but also the key element in an uneven network of forest, woodlots and treed patches and corridors that link with the Grand River, providing important habitat for the movement and survival of animal life.

The Grand River valley also contains numerous provincially significant marshes and wetland areas. Luther Marsh in the northern part of the valley is also outstanding biologically, for example with respect to its very high number of breeding bird species, and its diversity generally. The





Dunnville and Grand River wetlands in the lower valley near Lake Erie are also important for birds, fish and other animals.

HUMAN HERITAGE

The Cultural Mosaic

In human terms the Grand River Valley is outstanding for its ethnic or cultural mosaic. It contains features and landscapes which reflect the attitudes, values and effects of a wide variety of people, some of whom are still distinctive in the valley today (Table I). In the north are descendants of Scots and Irish immigrants. This includes many Scots in towns such as Guelph whose presence represents one of the major means of European settlement in Canada, i.e. the land company, in this case the Canada Land Company and the entrepreneurs who purchased land blocks from it for sale to immigrants. In the central basin are Mennonites as well as descendants of German immigrants of various religious backgrounds. In the lower basin below Paris are descendants of United Empire Loyalists, including the native people who came from New York in the 1780s after the American Revolutionary War.

The Native People

The valley is especially outstanding for the story it tells of the history and current role of native people. Archaeological research in the Grand River area has revealed sites and artifacts that date back thousands of years. Remains of Paleo-Indian people who hunted mastodon, bison and other Pleistocene or Ice Age fauna in southern Ontario some 9000 to 5000 years B.C. are concentrated in the lower valley below Paris. Remains of Archaic and other people who occupied the valley area some 5000 to 1000 years B.C. are also found in the lower and central valley in particular.

Remains of later Woodland peoples who practised shifting agriculture based on corn, beans and squash, date from about the time of Christ to about 1100 AD. These people lived in transient villages which have been found

TABLE I:

Outstanding Human Heritage Features Associated
With the River

<u>Significant Areas</u>	<u>Outstanding Features or Associations</u>
Lower Grand	<ul style="list-style-type: none"> - high concentration of archaeological sites - Dollier-Galinée Expedition, 1669 - Feeder Canal - Grand River Navigation Company
Six Nations	<ul style="list-style-type: none"> - major Loyalist settlement group, 1784 - Chiefswood
Brantford	<ul style="list-style-type: none"> - high concentration of archaeological sites - area of Historic Neutral settlement - Mohawk Chapel - Brant's Ford - Bell Homestead - Canal system
Paris	<ul style="list-style-type: none"> - cobblestone buildings - Penman knitting mills
Cambridge	<ul style="list-style-type: none"> - variety of limestone and grey granite buildings - variety of early settlement groups: Pennsylvania-Germans, Scots, Germans - variety of industrial heritage structures: flour and textile mills, foundries, furniture factories
Kitchener-Waterloo	<ul style="list-style-type: none"> - Centre of Pennsylvania-German and European German settlement - Pioneer Memorial Tower - Homer Watson - West Montrose Covered Bridge
Nith Valley	<ul style="list-style-type: none"> - high concentration of archaeological sites - Amish settlement, 1820s
Elora/Fergus	<ul style="list-style-type: none"> - concentration of waterpowered grist mills - limestone buildings - early Scottish influence in Fergus - Shand Dam (Belwood)
Guelph	<ul style="list-style-type: none"> - Canada Company headquarters, 1827 - concentration of buildings of architectural significance - Goldie, Allan & Phoenix mills - Col. John McCrae birthplace
Eramosa	<ul style="list-style-type: none"> - concentration of water-powered mills

primarily in the central valley area. These ancient folk are linked to the native people who live today on the Six Nations and New Credit Reserves along the west bank of the Grand south of Brantford. On the New Credit Reserve are descendants of the Mississauga Indians who succeeded the Neutrals, or late Woodland residents of the area.

The Six Nations Reserve is also home to descendants of Iroquois from New York who were awarded land all along the Grand River by the British government for their loyalty in the American War of Independence. These people subsequently migrated to Canada where they were led for many years by the well-known Joseph Brant. The history of their interactions with European and American immigrants and the gradual reduction of their reserve is a prominent example of an important theme in Canadian history. As the largest Indian reserve in southern Ontario, the Six Nations - New Credit area represents an unusual manifestation of Indian history and the continuity of the struggle to do well economically, culturally and environmentally today.

Industrial History

Another outstanding aspect of human heritage in the Grand River Valley is its industrial history. Numerous old mills and other historic structures are located along the Grand River, with many of them still being used today as factories, markets or restaurants in Guelph and Cambridge for example. A number of major technological innovations were made at historic sites along the valley as well. Examples are the invention of a rolling mill for grinding grain at St. Jacobs and Alexander Graham Bell's well-known invention of the telephone in Brantford. His house is preserved as a historic site on the Grand River bank in the southern part of the city. Other examples of industrial history include development of a canal system from Dunnville via Cayuga to Brantford in the period from about 1830 to the 1860s. Paddlewheelers and other craft passed along the Grand and its locks moving passengers, wheat and other goods to and from United States ports and other Canadian cities. Access to these other cities was facilitated by early nineteenth century construction of a feeder canal between the lower Grand, Lake Erie, Dunnville

area and the Welland Canal, St. Catharines, Hamilton and other nearby towns.

Remains of the Grand River locks and the Welland feeder canal are quite apparent today. The tourism potential for such industrial history seems good, especially if the interest of lower Grand River people in arranging for construction of a new lock and the development of boating and other tourism activities between Dunnville, Caledonia and points north comes to fruition. Major efforts are being made to develop tourist and associated facilities relating to industrial and other history in river towns such as Dunnville, Caledonia and Brantford.

RECREATION AND TOURISM

In terms of recreation and tourism, the Grand River valley offers many resources, facilities and opportunities. Some of these have just been discussed in the foregoing section. From the perspective of the case for the Grand as a Canadian Heritage River, three areas are considered to possess a combination of recreational opportunities and related biological values which are highly significant for naturalist activities, i.e. for wildlife viewing, hiking, fishing, and other outdoor activities. These three areas are the Luther Marsh in the upper reaches of the river, the Carolinian forest area in the central part of the basin, probably extending to include the Six Nations/New Credit Reserves, and the wetlands and marshes near Dunnville and Port Maitland at the mouth of the Grand. In addition, four areas have been identified as having highly significant clusters or combinations of recreational opportunities, including human heritage appreciation. These are Fergus/Elora/West Montrose, Elmira/St. Jacobs, Kitchener/Waterloo, and Brantford and area.

CONSTRAINTS

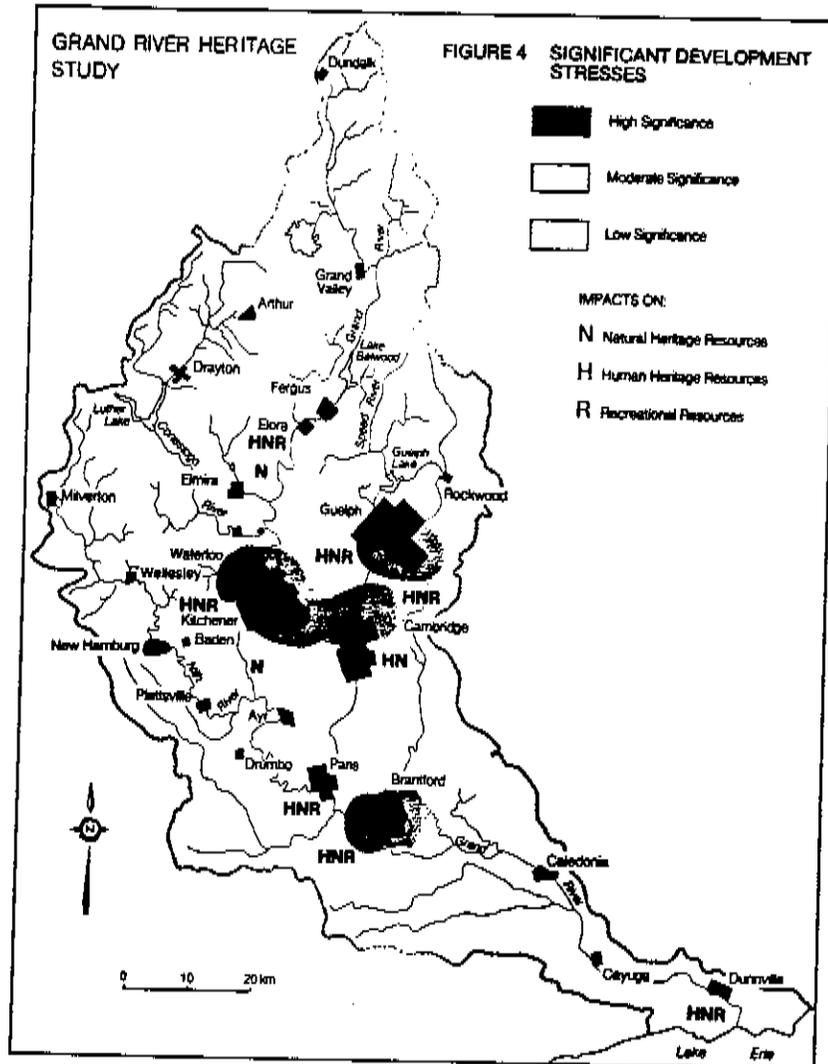
Many constraints can limit or prevent the appropriate use and conservation of the natural and human heritage and recreational opportunities along the

river. The most obvious or direct constraints have to do with rapid, recent urban development along the river. Residential, industrial, aggregate mining, and other development can destroy, damage or otherwise stress heritage resources and recreational opportunities along the Grand. Such development stresses are especially prominent in Kitchener/Waterloo, Cambridge, Guelph and Brantford (Figure 4). A major problem in rural areas is the impact of agriculture through clearing of vegetation and habitat for mechanized farming, artificial and tile drainage, and fertilizer run-off and other sources of pollution.

MANAGEMENT ARRANGEMENTS

Fortunately an array of laws, agencies, policies, guidelines, regulations and other means are available to eliminate or reduce these constraints upon appropriate use and conservation of heritage resources and recreation and tourism opportunities in the Grand River valley. Local and regional governments, the Grand River Conservation Authority (GRCA) and a number of provincial and federal government agencies such as the Ontario Ministry of Natural Resources and the Canadian Parks Service can assist with planning and management of heritage, recreation, tourism and quality of life generally. Among the means for appropriate use and protection are: floodplain and fill regulations; conservation areas; the land use and human or historical heritage policies of local governments; Environmentally Significant Areas (ESAs); agreement forests; Areas of Natural and Scientific Interest (ANSIs); provincial and national parks and historic sites; and perhaps international programs such as the UNESCO Man and Biosphere program (MAB).

In addition to these arrangements, interest and activity have been growing in private stewardship, that is, in employing leases, agreements or other means of encouraging private landowners to use and conserve heritage resources wisely. These arrangements seem particularly desirable in rural areas. A leading example at the moment is the landowner contact and private stewardship program for Carolinian forest lands organized by the University of Guelph and the Ontario Natural Heritage League.



MANAGEMENT ISSUES

Management Effectiveness

Among the concerns often put forward about the foregoing management arrangements is the matter of their effectiveness. Research is needed to determine how well these management arrangements work and how they can be improved.

Co-ordination

Another major management issue is how the various laws, agencies, regulations and other means can be best co-ordinated for appropriate use and conservation. A major vehicle in this regard could be the GRCA, which is comprised of municipalities from throughout the watershed functioning under the leadership of the Ontario Ministry of Natural Resources. The GRCA has played a lead role in areas such as water management. However more study is required to determine the best means of co-ordination. Underlying this interest in co-ordination is a concern for integrated planning and management in the Grand River Valley.

Co-ordination through provincial government bodies, the regional and local governments and the GRCA has already led to marked improvements in river water quality in the last two decades or so. The water quality along the river is now considered to be good to very good by the GRCA. Although water quality is not considered to be outstanding enough in its own right to be put forward as a reason for CHR status, it is satisfactory as support for the geologic, biologic and human features and processes upon which the case for designation is being made for the Grand (Nelson and O'Neill, 1989).

The development of hiking trails is another potential way of bringing the various agencies, groups and people together to provide for the integrity of Grand River Valley heritage and recreation. A report on Grand Valley Trails prepared for the background study shows that a very good trail system

has been developed in the Grand River Valley, notably in the last few years. This system links people and places in the valley and tends to make people more aware of and interested in the heritage qualities and scenic character of valley landscapes.

Boundary

The foregoing discussion raises another issue which must be addressed in a Management Plan, i.e. the delimitation of a boundary or border for the Canadian Heritage River. In other words we have to identify the parts of the river valley to which the CHR designation applies.

Public Awareness and Support

Another major issue has to do with the level of public awareness and potential support for use and conservation of Grand River heritage and associated recreation and tourism. Over one hundred and fifty people came to our June 1988 open houses and we have indirectly contacted thousands of people in the course of our work to date. But we remain uncertain of the degree of public understanding and commitment to the heritage river idea, although we believe it to be quite strong on the basis of experience so far.

Concerns of Native People

Another important issue is the claim of the Indian people to the bed and banks of the Grand River alongside the Six Nations reserve. This issue raises questions about river uses, with the Indians favouring maintenance and care of spawning areas and fishing opportunities in the context of any recreation or other developments.

Need for More Information and Study

A number of the reports prepared for this background study stress the need for more information, so that planning and management can be improved through increased understanding. Thus we need to know more about the biotic details of key areas such as the Carolinian section of the valley from

Cambridge to Paris. We need to know more about the industrial and technical history of the valley, neglected themes in heritage in Canada generally. Furthermore, many of the recreation and tourism statistics were completed some years ago and should be updated.

In summary then, means for managing heritage resources, recreation and tourism are present in the valley, although more study is required to find out how these arrangements can work most effectively. The three issues of management effectiveness, management co-ordination, and public awareness and commitment seem to be the major ones to be addressed in the management planning phase for the Grand. The Management Plan should also provide details on how specific heritage resources and recreation and tourism opportunities will be planned for along the length of the Grand River Valley.

Heritage and Sustainable Development

In thinking about awareness of heritage, we should also be thinking about ways of linking heritage use and conservation with recent ideas on development. Use and conservation are increasingly viewed as opposite sides of the same coin. They are essential to one another, as are heritage and development. Currently there is a strong interest in the concept of sustainable development as a philosophy for the future. The idea of sustainability is necessarily based on knowledge of the things that have come to us from the past. In this fundamental sense, heritage is an essential part of overall comprehensive planning and management in the Grand River Valley and its watershed. Furthermore, the Grand is of special interest in this context, for it is a much more developed river than those designated as Canadian Heritage Rivers to this point in time. The Grand is a kind of test case for the Canadian Heritage Rivers System in that it is not a wild stream like the French or the Clearwater Rivers. It has a much wider heritage in the sense of the natural to human history and the local, regional, provincial and national levels of significance attendant upon the many features and processes in the valley. If the Grand is designated as a Canadian Heritage River, a more sensitive combination of development and conservation surely will arise in the valley.

THE MANAGEMENT PLAN STUDY

On May 24, 1989, confirmation was received of financial support from the Canadian Heritage Rivers Board for the preparation of a proposed management plan as well as a nomination document. The GRCA had previously agreed to match this funding, so the Grand River Management Plan Study is being supported in the same fashion as the background study in 1988. A general scheme or strategy for the management plan has been developed for consideration by interested agencies and the public. Open houses on this possible strategy and related matters will be held in the lower, middle and upper Grand River Valley in early June, 1989. Suggestions and ideas from these open houses and other meetings will be carefully considered in an intense research period during the summer. A draft nomination document will be submitted to the Steering Committee for the Grand River Heritage Management Plan study in early October. The proposed management plan will be presented to the public at a workshop and/or open house in November. A presentation of both reports to the Grand River Conservation Authority members is also planned for about the same time. A final nomination document and the proposed management plan will be presented to the Canadian Heritage Rivers Board in January, 1990. The final management plan is expected to be published in summer, 1990.

The scheme or strategy for the management plan is based on a system of nodes and corridors along the valley. Three nodes are considered to be vital to this system. They are the Luther Marsh, Cambridge-Paris and Dunnville areas. These nodes are outstanding from the biological and the human history standpoints. They also offer various kinds of naturalist and other recreation opportunities, including hunting and fishing, canoeing, bird watching and hiking. Other nodes are possible as well; for example the Elora area is outstanding for geological and human historical reasons as well as recreation and tourism opportunities.

The corridors linking the three proposed nodes are regulated for development by the flood and fill regulations of the Grand River Conservation Authority as well as the approval systems of the municipalities

and other government agencies. Through these regulations, policies and guidelines, it should be possible to maintain "green spaces" along the floodplain and lower valley. In this way biological, recreational and other connections could be maintained among and between the three nodes along the river while at the same time reducing potential damages to residential, industrial and other development often unsuited to this hazard zone.

As further support for the appropriate use and conservation of the outstanding heritage resources and recreation opportunities in the Grand River Valley, the three outstanding heritage areas and the linking river valley corridors can be fitted into a watershed resources plan currently being reviewed by the GRCA. The future of these planning efforts rests largely on public response in ensuing months. The successful implementation of such integrated planning is fundamental to the sustainable development of the Grand River area in the decades ahead.

REFERENCES

- Cathexis Associates, 1987. *Revised Heritage Rivers Evaluation Project*. Parks and Recreational Areas Branch, Ontario Ministry of Natural Resources, Toronto.
- MacLennan, Hugh, 1974. *Rivers of Canada*. (With the camera of John De Visser). MacMillan Co., Toronto.
- Nelson, J.G. and Pauline O'Neill (eds.), 1989. *The Grand as a Canadian Heritage River*. Occasional Paper 9, Heritage Resources Centre, University of Waterloo, Waterloo, Ontario.

APPENDIX C

November 1989 Public Documents

VALUES

What is the value of Canadian Heritage River designation? Why should Grand River valley residents seek this status?

- a) It involves collection of information on natural, human and recreational resources that is financed in large part by senior governments and provides directly and indirectly for employment in the Grand River area.
- b) It provides for the identification and the appropriate use and conservation of outstanding natural, human, and recreational resources of long term importance to the region, the province, and the nation.
- c) It provides for economic development -- notably tourism and related activities -- commensurate with and largely reliant upon conservation of the outstanding resources in the Grand River area.
- d) It sets an image which promotes better overall management of resources and development.
- e) It provides for co-operation and co-ordination among people and communities in the valley.
- f) It provides information of value for education and learning of all kinds.
- g) It provides information important to wise management of resources and to improved quality of life.
- h) It can provide the basis for a thrust to sustainable development, the kind of future espoused in recent reports like Our Common Future by the international Bruntland Commission.

DRAFT
November 13, 1989



CANADIAN HERITAGE RIVERS SYSTEM

**Summary
Nomination Document
for the Grand River
Ontario**

Prepared for the Canadian Heritage Rivers Board

**J.G. Nelson
David A. Balser
Pauline C. O'Neill**

**Heritage Resources Centre
University of Waterloo**

Figure 1. River Location



River Nomination

WHEREAS the Grand River, located in Southern Ontario between Georgian Bay and Lake Erie, possesses outstanding human heritage and recreational resource values; and

WHEREAS the Grand River is representative of the many peoples and cultures which have lived along Canadian rivers, and is unique in the rarity and number of these that are still present in the valley; and

WHEREAS the Grand River has been the home of native peoples for thousands of years and is the domicile of the Six Nations Loyalists who migrated to Canada after the American Revolutionary War in 1776; and

WHEREAS the Grand River valley contains many representative examples of nineteenth and early twentieth century factories, canals, railways and other artifacts of the industrial age; and

WHEREAS the Grand River and its levees, weirs, land use zoning and other engineering and social systems are representative of the long Canadian struggle with floods and uneven river flows; and

WHEREAS the Grand River is associated with many famous Canadians such as Etienne Brulé, William Hamilton Merritt, Alexander Graham Bell, Homer Watson, John Galt, and William Lyon Mackenzie King; and

WHEREAS the Grand River has outstanding recreational opportunities, which include natural and human heritage appreciation best afforded by canoeing, boating, hiking, walking and touring along the river; and

WHEREAS the Grand River is protected by an array of provincial, regional and local laws, regulations, policies and guidelines, co-ordinated throughout the valley by the Grand River Conservation Authority;

THEREFORE it is recommended by the Province of Ontario that, upon completion of a management plan within three years of acceptance of the nomination, the Grand River be designated to the Canadian Heritage Rivers System for the purpose of recognizing the outstanding human heritage values represented by: the array of different peoples living within the watershed; its Indian or native heritage; the mills, canals and other nineteenth century industrial artifacts; the many examples along its banks of the Canadian struggle with rivers; and the excellent variety of human and natural heritage appreciation and recreation opportunities available along its length.

Summary and Justification

The Grand River has already achieved recognition as an outstanding Canadian stream, for example by the famous student of Canadian rivers, Hugh MacLennan, author of *Two Solitudes* and other well known writings. He was most impressed with the Grand's human qualities, with its long history of use by pre-European folk, with the strong presence of the Mohawk and other native peoples today, and with the many old mills, canals, factories and other artifacts of settlement by different ethnic and national groups: French, Mennonites, Germans, Scots, Irish, English, and Americans, notably the Loyalists.

It is for these human heritage qualities and for its wide range of excellent recreation opportunities that the Grand is being nominated for designation as a Canadian Heritage River. The Grand is not being nominated for natural reasons because it is a stream which has been changed by weirs, dams and other human constructs so that it does not conform with the Canadian Heritage Rivers System integrity guidelines for natural heritage. However, the Grand does have a rich diversity of birds and other animals, as well as valued Carolinian forests, wetlands, glacial and other geologic features which are the basis for many of the excellent recreation opportunities along the river.

Human Heritage

The human heritage value guidelines for Canadian Heritage River status basically state that a candidate river must have had "a major impact on the region in which it is located or beyond; this would include its role in such significant historical themes as native people, settlement patterns and transportation." The river should also be "strongly associated with persons, events, movements, achievements, ideas or beliefs of Canadian significance." The candidate river should also contain historical or archaeological structures which are unique, rare, very old, or representative of major themes in Canadian history.

The major impact that the Grand River has had on Ontario and other parts of Canada can be demonstrated through a discussion of four historic themes: the cultural mosaic, native people, industrial history, and the story of human adaptation to the floods and other fluctuations of the river. In discussing these themes it is also apparent that the river is strongly associated with persons and achievements of Canadian significance. The river also contains historical structures and archaeological sites which are rare or are representative of major themes in Canadian history (Table 1).

The Cultural Mosaic

In human terms the Grand River valley is outstanding for its ethnic or cultural mosaic. It contains features and landscapes which reflect the attitudes, values and effects of a wide variety of people, some of whom are still distinctive in the valley today. In the north are descendants of Scots, Irish and English immigrants. This includes many Scots in towns such as Guelph whose presence represents some of the major means of European settlement in Canada, i.e. the land company, in this case the Canada Land Company and the entrepreneurs who purchased land blocks from it for sale to immigrants. In the central basin are Mennonites as well as descendants of German immigrants of various religious backgrounds. In the lower basin below Paris are descendants of United Empire Loyalists, including the native people who came from New York in the 1780s after the American Revolutionary War.

Table 1

Outstanding Human Heritage Features Associated With the River

Significant Areas	Outstanding Features or Associations
Lower Grand	<ul style="list-style-type: none"> - high concentration of archaeological sites - Dollier-Galinée Expedition, 1669 - Feeder Canal - Grand River Navigation Company
Six Nations	<ul style="list-style-type: none"> - major Loyalist settlement group, 1784 - Chiefswood
Brantford	<ul style="list-style-type: none"> - high concentration of archaeological sites - area of Historic Neutral settlement - Mohawk Chapel - Brant's Ford - Bell Homestead - Canal system
Paris	<ul style="list-style-type: none"> - cobblestone buildings - Penman knitting mills
Cambridge	<ul style="list-style-type: none"> - variety of limestone and grey granite buildings - variety of early settlement groups: Pennsylvania-Germans, Scots, Germans - variety of industrial heritage structures: flour and textile mills, foundries, furniture factories
Kitchener-Waterloo	<ul style="list-style-type: none"> - Centre of Pennsylvania-German and European German settlement - Pioneer Memorial Tower - Homer Watson - West Montrose Covered Bridge
Nith Valley	<ul style="list-style-type: none"> - high concentration of archaeological sites - Amish settlement, 1820s
Elora/Fergus	<ul style="list-style-type: none"> - concentration of waterpowered grist mills - limestone buildings - early Scottish influence in Fergus - Shand Dam (Belwood)
Guelph	<ul style="list-style-type: none"> - Canada Company headquarters, 1827 - concentration of buildings of architectural significance - Goldie, Allan & Phoenix mills - Col. John McCrae birthplace
Eramosa	<ul style="list-style-type: none"> - concentration of water-powered mills

Native People

The Six Nations/New Credit Indian Reserve (pop. 7,000) is the largest reserve in central and southern Ontario. It has been the home of famous native leaders such as Joseph Brant and the poetess Pauline Johnson. The reserve and the people are a reflection of thousands of years of history that far surpasses the roughly three centuries of European settlement in the area. The Grand River valley is the site of paleo-Indian tools and other artifacts from mammoth, bison and other hunting days, some 8,000 to 10,000 years ago. The archaeology of the valley also yields evidence of later Archaic hunting peoples and also of the Woodland peoples who hunted and grew corn, beans and squash in the period from about the time of Christ to the twelfth and later centuries.

Industrial History

The industrial heritage of the Grand River valley is apparent in almost every town along its banks, and especially in places such as Elora, Cambridge, Paris and Brantford (Figure 2). Here can be seen the old grist mills and factories which are often used today for markets or for restaurants, as well as rare and unusual architecture such as the cobblestone buildings of Paris. In the lower river valley from Brantford through York, Caledonia, Cayuga and Dunnville there remain old locks, canals and other signs of the Grand River Navigation Company system which linked the communities along the river with the Welland Canal, other Great Lakes ports and the rest of North America and the world. William Hamilton Merritt was one of the early entrepreneurs associated with these canals and commercial ventures.

Human Adaptation to the River

Another outstanding aspect of human heritage in the Grand River valley is the story of human adaptation to floods, summer low flows and other fluctuations of the river. Levees, breakwalls, gabions and other engineering responses are apparent as well as zoning, flood-proofing and other behavioural responses. Examples of the problems with and of enhancement of wildlife, sediment and other natural features and processes as a result of human adaptations are to be seen in the valley. Of interest also are attempts to marry flood and other adaptations with heritage conservation and recreation, as for example with the "Living Levee" in Cambridge.

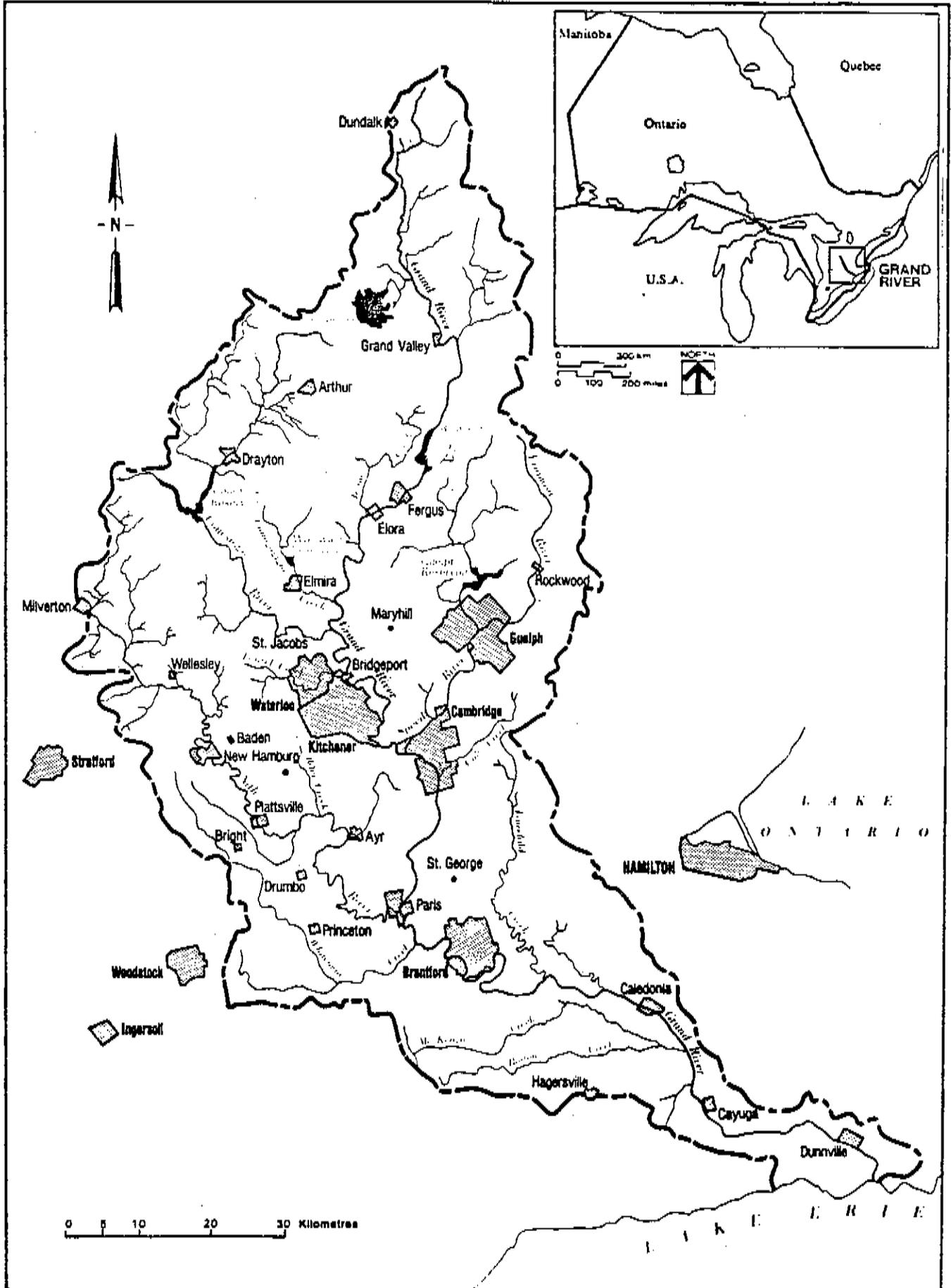
Integrity of Human Heritage

From the standpoint of human integrity, many of the buildings and other artifacts of human heritage along the Grand River still maintain the visual appearance of nineteenth and early twentieth century days. Examples are the Loyalist buildings and landscapes in the lower valley, the landscape and forested scene on the Six Nations/New Credit Reserve, and the mills, railways and canals in or near towns such as Elora, Cambridge, Paris and Dunnville. In many places neighbouring land uses do not seriously affect the historical experience offered by the river, notably in the Mennonite and other country north of Waterloo, in the lower river from Brantford to Dunnville, and in the free-flowing wooded reach from Cambridge to Paris known as the Grand River Forest.

Recreation

According to the Canadian Heritage River guidelines for recreation, outstanding recreational value will be recognized when a river environment "possesses an appropriate combination of recreational opportunities and related natural values which together provide a capability for an outstanding recreational experience....Recreational opportunities include such activities as boating, hiking, swimming, camping, wildlife viewing, and human heritage appreciation; natural values include natural visual aesthetics, that is, diversity and quality of scenic beauty

Figure 2. Location of the Grand River Basin



and physical essentials, such as sufficient flow, navigability, rapids, accessibility and suitable shoreline." The river should also be "capable of supporting recreational uses without significant loss of or impact on its natural, historical or aesthetic values."

A brief discussion of five recreation themes shows that the Grand River valley has the excellent range of recreation opportunities, the human and natural heritage values, and the capability to meet these guidelines.

Five themes can be used to describe the recreation patterns along the Grand. These are:

- Water sports: canoeing, kayaking, sailing, power boating and water skiing, and swimming.
- Nature/scenic appreciation: picnicking, camping, and naturalist activities such as birdwatching and photography.
- Fishing and hunting
- Trails and corridors: pedestrian and/or equestrian trails, scenic drives and/or cycling routes, and cross-country skiing or snowmobiling trails.
- Human heritage appreciation: historic walking tours, historic buildings, and events and festivals.

Towns and cities such as Fergus, Elora, St. Jacobs, Waterloo, Kitchener, Guelph, Cambridge, Paris and Brantford, as well as the lower river settlements down to Dunnville, are the sites of most of the recreational activities associated with historic heritage and with fairs, festivals and other events. Water sports are pursued in and near these settlements, and also along most rural stretches of the river. The hiking trail system is perhaps the most varied and well developed of any watershed in the province, and links communities and places along the valley. Certain rural areas are especially good for naturalist activities, for camping, fishing, canoeing and boating. These include Luther Marsh, the Grand River Forest between Cambridge and Paris, and the Byng Island Conservation Area and wetlands near Dunnville. The Grand River Forest area encompasses about 20 kilometres of relatively undisturbed woodland along a free-flowing stretch of the river which is excellent for canoeing and boating, especially in the spring.

Many outstanding natural features occur along the Grand and support its human heritage and recreation and tourism opportunities. The extensive wetlands at Luther Marsh and in the Dunnville area are examples. The deep gorge at Elora and the giant stream-bored potholes at Rockwood are others. The Grand River Forest is a unique resource, with its extensive woodlands, long reach of free-flowing stream, Carolinian species representative of a vegetation type found only in southern Ontario in Canada, and also with its many small wetlands, rare plants, and excellent examples of recessional moraines, tills, and other remnants of glaciation.

Integrity for Recreation

In addition to meeting the recreation value guidelines for Canadian Heritage River status, the Grand River possesses good to very good water quality, suitable for the foregoing recreation opportunities throughout its length. The high level of this water quality is due to efforts by many provincial, regional and local agencies and the Grand River Conservation Authority during the last two decades in particular.

Evaluation

Clearly many outstanding heritage resources and recreation opportunities are found along the Grand as well as forests, gorges and other natural features needed to support appropriate use and conservation. The human and natural heritage features and the recreation opportunities have often been recognized by federal, provincial or regional authorities as outstanding in the sense that they are unique or rare, or unusually representative of a heritage theme or activity

viewed as important in Ontario or Canada, or in that they have unusual scientific value. Thus these areas may contain Ontario historic sites or plaques, Ontario Areas of Natural and Scientific Interest (ANSIs), Ontario Wildlife Management Areas, Class I or Class II wetlands in the Ontario system, regional Environmentally Significant Areas, and other manifestations of high heritage, recreation, educational and other values.

The areas, nodes or landscapes which are considered outstanding in this respect are Elora and Elora Gorge, Rockwood, St. Jacobs, Cambridge to Paris and the Grand River Forest area, and Dunnville and the lower river, including the Grand River navigation canal sites at Brantford, York, Caledonia, Cayuga and other centres. The Six Nations/New Credit Indian Reserve is another outstanding site which is remarkable for its forest cover, Carolinian vegetation and living heritage of the Mohawk and other native peoples. This site has not been given special treatment because the native people did not want to become directly involved in the Grand River Heritage Study at this time. Table 1 gives a brief summary of some of these areas and their key heritage and recreation features.

Integrity

A river must meet general integrity guidelines for designation to the Canadian Heritage Rivers System. According to these guidelines the river must be "of sufficient size and contain all or most of the key inter-related and inter-dependent elements" identified as having values essential to the nomination of a river. The entire Grand is being nominated, which covers a major stream length of 290 kilometres in addition to the tributaries located in a watershed of about 6,965 square kilometres (Figure 3). The areas with special heritage values are already largely protected by GRCA owned conservation areas, by municipal or regional zoning or policy areas such as ESPAs (Environmentally Significant Policy Areas), or by historic designations. In the management plan a proposal is being made to introduce more extensive landscape plans to include more of these areas in a co-ordinated valley-long system. As noted above, the water quality in the valley is generally very good, in large part because of the efforts of an array of government agencies.

A varied system of agencies and institutions has developed over the years to provide for conservation and appropriate use of the human and natural heritage resources and recreation opportunities in the Grand River valley (Table 2 and Table 3). These agencies have also necessarily become involved in educational, scientific and quality of life activities associated with heritage planning and management. Among these agencies are provincial organizations such as the Ontario Ministry of Natural Resources (OMNR), the Ontario Ministry of Culture and Communications (OMCC), and the Ontario Ministry of Environment (OMOE); federal agencies such as the Canadian Parks Service; regional and local governments; and the Grand River Conservation Authority (GRCA). The GRCA is an especially important agency, not only because of its charge to implement natural resource management programs, exclusive of oil, gas and other minerals, in the watershed, but also because of its long-standing co-ordinating role in water management, notably floods and hazard adjustments, low flow augmentation, pollution control, and recreational and other uses. The GRCA is already playing a lead role in heritage and recreation in association with the other relevant agencies in the basin, and is interested in implementing a Canadian Heritage River program, with a focus on maintaining the integrity and providing for the appropriate use of human and natural heritage resources in the valley.

Figure 3. Schematic of Outstanding Heritage Areas and Corridors

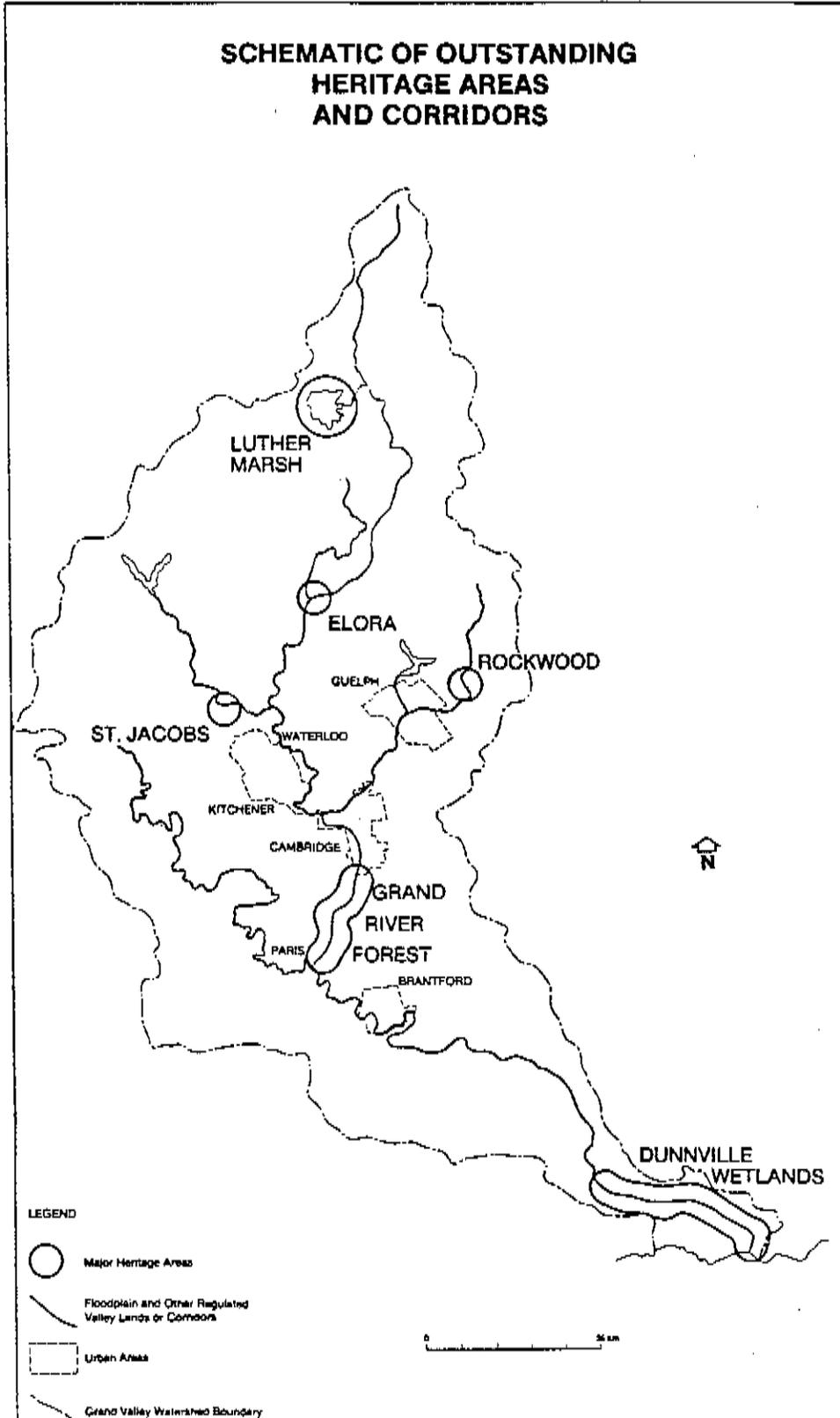


Table 2

Major Human Heritage Agencies and Management Arrangements*

Federal:

<i>Ministry of the Environment</i>	Historic Sites and Monuments Act National Parks Act National Battlefields Commission Canadian Heritage Rivers System Co-operative Heritage Areas Federal Advisory and Coordinating Committee on Heritage Conservation Environmental Assessment and Review Processes Canadian Inventory of Historic Buildings Restoration Services Division
<i>Ministry of Indian Affairs and Northern Development</i>	Indian Act
<i>Transport Canada</i>	Railway Act
<i>Department of Finance</i>	Income Tax Act
<i>Department of Communications</i>	National Gallery of Canada Canadian Museum of Civilization National Museum of Natural Science National Museum of Science and Technology

Provincial:

<i>Ministry of Culture and Communications</i>	Ontario Heritage Act Ontario Heritage Foundation Heritage Conservation Easements Designated Property Grant Local Architectural Conservation and Advisory Committees
<i>Ministry of Municipal Affairs and Housing</i>	Planning Act Municipal Act Ontario Building Code
<i>Ministry of the Environment</i>	Environmental Assessment Act Environmental Protection Act
<i>Ministry of Tourism and Recreation</i>	Historic Parks Act

* Many of these arrangements also relate to recreation.

Ministry of Natural Resources

Conservation Authorities Act
Lakes and Rivers Improvement Act

*Ministry of Consumer and Commercial
Relations*

Cemeteries Act

Formal Interest Groups:

Heritage Canada Foundation
Ontario Historical Society
Ontario Archaeological Society
Architectural Conservancy of Ontario
Archindont (Architectural Index of Ontario)
Archives of Ontario
Association of Heritage Consultants
Association for Preservation Technology
Canadian Centre for Architecture
Canadian Conservation Institute
Canadian Oral History Association
Multicultural History Society of Ontario
Ontario Association of Architects
Ontario Museum Association
Ontario Society for Industrial Archaeology
Society for Industrial Archaeology
Society for the Study of Architecture in Canada
Southwestern Ontario Archivist Association
Local Historical societies
Local ethnic-cultural organizations

Table 3

Major Agencies and Institutional Arrangements for Natural Area Protection in the Grand River Basin*

Agencies Legislation, Regulations, Policies

Federal:

<i>Canadian Heritage Rivers Board</i>	Heritage Rivers System
<i>Department of Fisheries and Oceans</i>	Fisheries Act (1970)

Provincial:

<i>Ministry of Environment</i>	Environmental Protection Act (1971) Ontario Water Resources Act (1956)
<i>Ministry of Natural Resources</i>	Ministry of Natural Resources Act (1972) Provincial Parks Act (1954) Ontario Heritage Act Game and Fish Act Conservation Lands Act Forestry Act Woodlands Improvement Act ANSI Planning and Management Guidelines District Land Use Guidelines Wetlands Policy Statement (Draft) Floodplain Planning Policy Statement (1988)
<i>Ministry of Agriculture and Food</i>	Ministry of Agriculture and Food Act Agricultural Rehabilitation and Development Act Foodland Preservation Policy Statement (Draft)

Regional:

<i>Grand River Conservation Authority</i>	Conservation Authorities Act (1954) GRCA Interim Resource Management Plan Fill, Construction, and Alteration to Waterways Regulations and Guidelines and Procedures
<i>Municipal, County, and Regional Governments</i>	The Municipal Act The Planning Act The Trees Act

* Many of these arrangements also relate to recreation.

Non-Government Organizations:

Nature Conservancy of Canada
Wildlife Habitat Canada
Ontario Heritage Foundation Ontario Heritage Act
Natural Heritage League
Grand Valley Conservation Foundation
Heritage Resource Centre
K-W Field Naturalists
Hamilton Naturalists' Club
Guelph Field Naturalists
Norfolk Field Naturalists
Soil and Water Conservation Society
Canadian Water Resources Association
Water Network, University of Waterloo

Source: Steinacker, 1989

Outline of a Draft Plan for the Grand as a
Canadian Heritage River

DISCUSSED

AT
OPEN HOUSE

NOVEMBER 13, 1989

Prepared as Part of the
Grand River Heritage Study

J.G. Nelson
Heritage Resources Centre
University of Waterloo

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*Heritage Resources Centre
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Prepared as Part of the Grand River Heritage Study

I. The Special Heritage Qualities of the Grand

When viewed from the perspective of human heritage, the Grand is considered to be the most important valley in Ontario and one of the most important in Canada (Figure 1). The Grand has a cultural mosaic unparalleled in the province and perhaps in the country as a whole. Since the coming of the Europeans to the area in the early seventeenth century it has been traversed by French fur traders and missionaries and lived in by Indian and American Loyalists who came to the Grand after the Revolutionary War in 1776. It has also been home to Mennonites, Germans, Scots, Irish, English, and more recently, post-World War II migrants such as the Portuguese. The Grand River valley has a rich Indian history, including the Neutrals who were driven out by the Iroquois in 1649 as well as earlier Woodland, Archaic, and Paleo-Indian people who cultivated, hunted, and fished there about 1,000, 3,000, and 8,000 years ago respectively.

The valley also shows artifacts and living remnants of the nineteenth and early twentieth century industrial age: old mills; navigation canals; early architecture and urban settlements, sometimes abandoned like the German mill in the Grand River forest above Paris, sometimes still used for markets, restaurants, and other purposes as near the river today in Fergus, Elora, or Cambridge.

The Grand Valley also possesses many vivid portrayals of the human struggle with flooding and the uneven flows of the river, a struggle which has been a common theme in settled valleys throughout Canada. The banks and floodplains of the Grand are marked in many places with earthen levees, stone breakwalls, gabions, and other engineering defenses against floods as well as dams and weirs built to increase naturally low summer flows or to stabilize discharge at levels high enough for transport of goods by boat.

The river valley is also marked by many signs of the impact of human history on nature. Some areas such as the Luther Marsh in the headwaters of the river, appear to be more diverse in birds, other animals, and plants than in pre-European days before the building of dams made the wetlands more extensive. Other areas are special because they are among the few which have been relatively undisturbed by human activities, the outstanding example

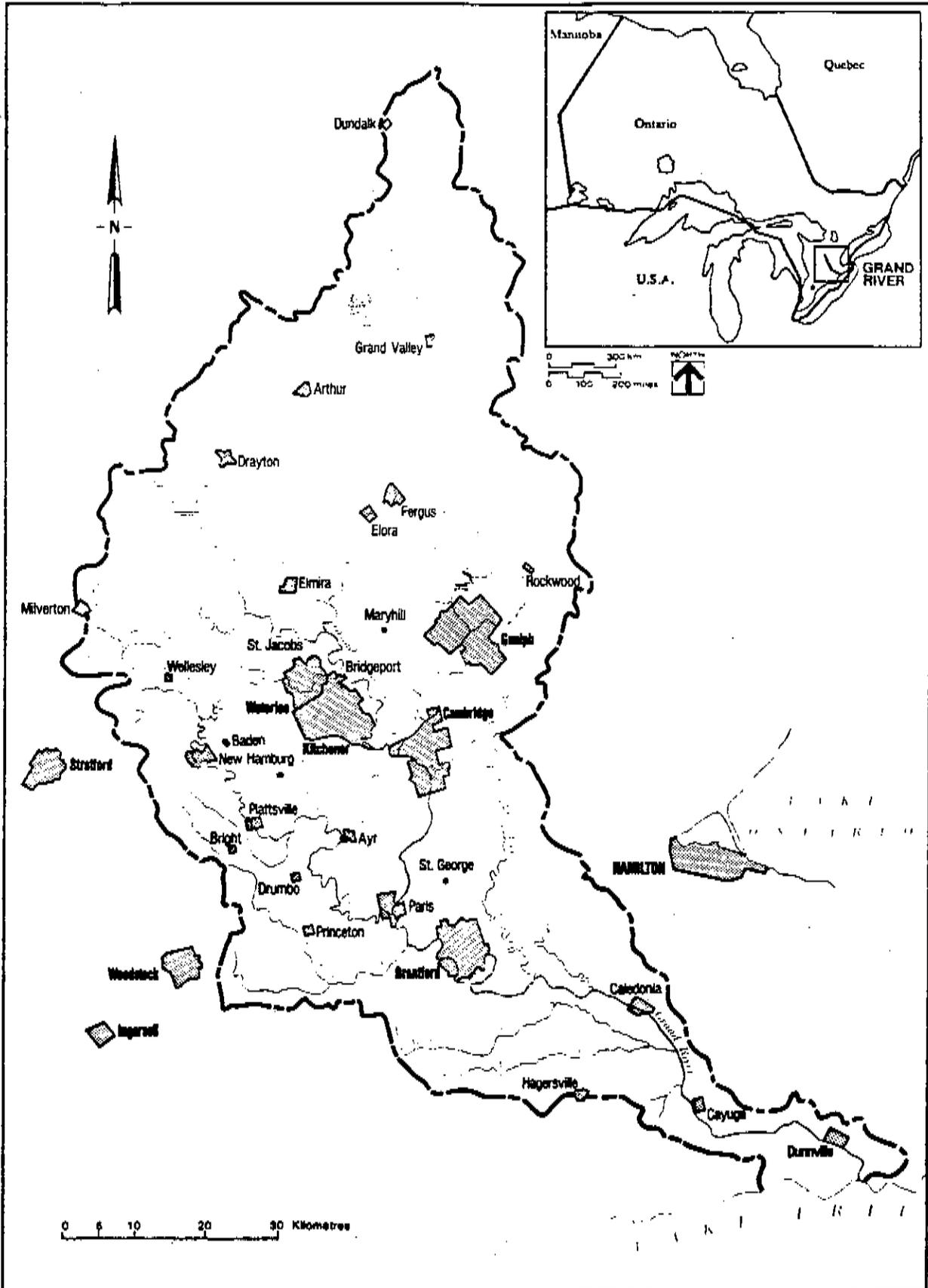


Figure 1. Location map of the Grand River basin.

being the twenty kilometre free-flowing Grand River forest area between Cambridge and Paris. This area is also outstanding on more strictly natural grounds, being the site of southern or Carolinian species not found much farther north.

Sawdust from mills and domestic, industrial, and other human waste led to serious pollution problems in the river in the nineteenth and early twentieth centuries. Today, on the other hand, water quality along the river is generally very good, having improved considerably since the beginning of vigorous pollution control activities in the 1960's. Water quality is certainly high enough to protect human heritage and recreational opportunities along the river, although continued efforts are needed to counteract effects of rapid growth, for example in urban areas.

II. Heritage Values

The human and natural heritage of the Grand has many values. It is an important source of historic understanding about our origins and the paths we have travelled through time. It is a source of inspiration and a basis for judgement about the often rapid changes going on around us. This rich heritage also provides for high level recreation, education, and quality of life. This heritage has economic value as a resource for tourism and related activities. The natural systems are also important in their own right, independent of humans.

III. Institutional Arrangements

Concern about responsibility for this heritage and its values has led to the development of many laws, regulations, policies, programs, government agencies, private organizations, and other institutional arrangements to provide for protection and appropriate use. Tables 1 and 2 summarize the range and comprehensiveness of these institutional arrangements, which have worked reasonably well to date. It is largely due to these arrangements and to effective private stewardship that so much heritage remains with us today. However, rapid recent industrial, technical, residential, and other growth in many parts of the valley is now posing *stresses which require improvements in institutions and in management. Briefly, these improvements have to do with: the lack of a generally acceptable mission statement on heritage conservation and use; uncertainties about objectives; underlying ideas and a framework to meet these objectives; information on the state of heritage in the valley and the ways in which it is changing; and means of implementing and co-ordinating heritage planning and management among concerned agencies, groups, and individuals in the Grand River valley.*

The following proposed plan or strategy is intended to build on the existing planning and management system in addressing these issues and challenges.

IV. Heritage Mission Statement

To conserve and enhance for future generations the human and natural heritage of the Grand River valley and the associated opportunities for inspiration, recreation, education, economic activities, quality of life and ultimately for sustainable development.

TABLE 1

**Major Human Heritage Agencies and
Management Arrangements***

Federal:

Ministry of the Environment

Historic Sites and Monuments Act
National Parks Act
National Battlefields Commission
Canadian Heritage Rivers System
Co-operative Heritage Areas
Federal Advisory and Coordinating Committee
on Heritage Conservation
Environmental Assessment and Review
Processes
Canadian Inventory of Historic Buildings
Restoration Services Division

*Ministry of Indian Affairs and Northern
Development*

Indian Act

Transport Canada

Railway Act

Department of Finance

Income Tax Act

Department of Communications

National Gallery of Canada
Canadian Museum of Civilization
National Museum of Natural Science
National Museum of Science and Technology

Provincial:

Ministry of Culture and Communications

Ontario Heritage Act
Ontario Heritage Foundation
Heritage Conservation Easements
Designated Property Grant
Local Architectural Conservation and Advisory
Committees

Ministry of Municipal Affairs and Housing

Planning Act
Municipal Act
Ontario Building Code

* Many of these arrangements also relate to recreation.

<i>Ministry of the Environment</i>	Environmental Assessment Act Environmental Protection Act
<i>Ministry of Tourism and Recreation</i>	Historic Parks Act
<i>Ministry of Natural Resources</i>	Conservation Authorities Act Lakes and Rivers Improvement Act
<i>Ministry of Consumer and Commercial Relations</i>	Cemeteries Act

Formal Interest Groups:

Heritage Canada Foundation
Ontario Historical Society
Ontario Archaeological Society
Architectural Conservancy of Ontario
Archindont (Architectural Index of Ontario)
Archives of Ontario
Association of Heritage Consultants
Association for Preservation Technology
Canadian Centre for Architecture
Canadian Conservation Institute
Canadian Oral History Association
Multicultural History Society of Ontario
Ontario Association of Architects
Ontario Museum Association
Ontario Society for Industrial Archaeology
Society for Industrial Archaeology
Society for the Study of Architecture in Canada
Southwestern Ontario Archivist Association
Local Historical societies
Local ethnic-cultural organizations

TABLE 2

Major Agencies and Institutional Arrangements for Natural Area Protection in the Grand River Basin*

Agencies Legislation, Regulations, Policies

Federal:

<i>Canadian Heritage Rivers Board</i>	Heritage Rivers System
<i>Department of Fisheries and Oceans</i>	Fisheries Act (1970)

Provincial:

<i>Ministry of Environment</i>	Environmental Protection Act (1971) Ontario Water Resources Act (1956)
<i>Ministry of Natural Resources</i>	Ministry of Natural Resources Act (1972) Provincial Parks Act (1954) Ontario Heritage Act Game and Fish Act Conservation Lands Act Forestry Act Woodlands Improvement Act ANSI Planning and Management Guidelines District Land Use Guidelines Wetlands Policy Statement (Draft) Floodplain Planning Policy Statement (1988)
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* Many of these arrangements also relate to recreation.

*Municipal, County, and Regional
Governments*

The Municipal Act
The Planning Act
The Trees Act

Non-Government Organizations:

Nature Conservancy of Canada
Wildlife Habitat Canada
Ontario Heritage Foundation Ontario Heritage Act
Natural Heritage League
Grand Valley Conservation Foundation
Heritage Resource Centre
K-W Field Naturalists
Hamilton Naturalists' Club
Guelph Field Naturalists
Norfolk Field Naturalists
Soil and Water Conservation Society
Canadian Water Resources Association
Water Network, University of Waterloo
The Grand Valley Trails Association

Source: Steinacker, 1989

V. Objectives

1. To manage the Grand Valley wisely in order to protect its outstanding human heritage qualities, its recreational and other values, and the vegetation, wildlife, scenery, and other natural characteristics upon which these qualities are based.
2. To maintain and enhance the high water quality necessary for the sustenance and enjoyment of the human heritage, recreation, and other values, as well as the health of the river system as a whole.

VI. Underlying Ideas and A Framework for Heritage Planning and Management

1. The first underlying or basic idea is to designate the Grand River valley as a Canadian Heritage river, first, on grounds of its outstanding human heritage qualities, and its high recreational and other values, and second, in order to secure the high level of planning and management commensurate with such stature. The recognition that the Grand is of truly national stature among Canadian rivers, will motivate stronger interest in and commitment to excellent planning and management among both government agencies and the private sector. The river should be accorded the special attention that it deserves.
2. The second basic idea is to provide a powerful theme or approach to heritage planning and management which is appropriate to the high quality of the river. Some of the high human heritage and other values of the river are threatened today by a growing array of industrial, technical, residential and other changes which require both a more comprehensive and a more focussed management approach. An idea, or philosophy is needed which will allow for the identification of development stresses over the river as a whole, yet facilitate a response in terms of priorities because funding, and other constraints do not permit an attack on all fronts. The appropriate idea or philosophy in these circumstances is thought to be a landscape approach with a focus on the outstanding heritage areas identified through surveys conducted as part of this Grand River Heritage Study. The landscape approach directs attention to heritage patterns over large areas. In the Grand we see a patchwork of human and natural heritage sites, areas, and recreational opportunities, not sufficiently tied together in a mutually supportive way through flows of high quality water, wildlife, and plant species, along pathways or corridors. Looked at from this broad perspective, landscape planning and the conservation and appropriate use of outstanding heritage areas should be tied together through a system of nodes and corridors. The underlying principle is that a landscape cannot maintain its outstanding human and natural attributes and recreational opportunities, without an interconnected nodes and corridors system which maintains essential flows of energy, sediments, plants, wildlife and people.
3. Outstanding heritage areas (nodes), have been identified in 1988/89 heritage surveys and include the Luther Marsh, Elora and the Elora Gorge, Rockwood Conservation Area, St. Jacobs, Cambridge-Paris and the intervening Grand River forest area, as well as the nineteenth century canal and the Dunnville wetlands, in the lower river (Figure 2).
4. The main channel and tributaries of the Grand Valley are viewed as the corridors linking the outstanding heritage areas (Figure 2). Currently construction in these

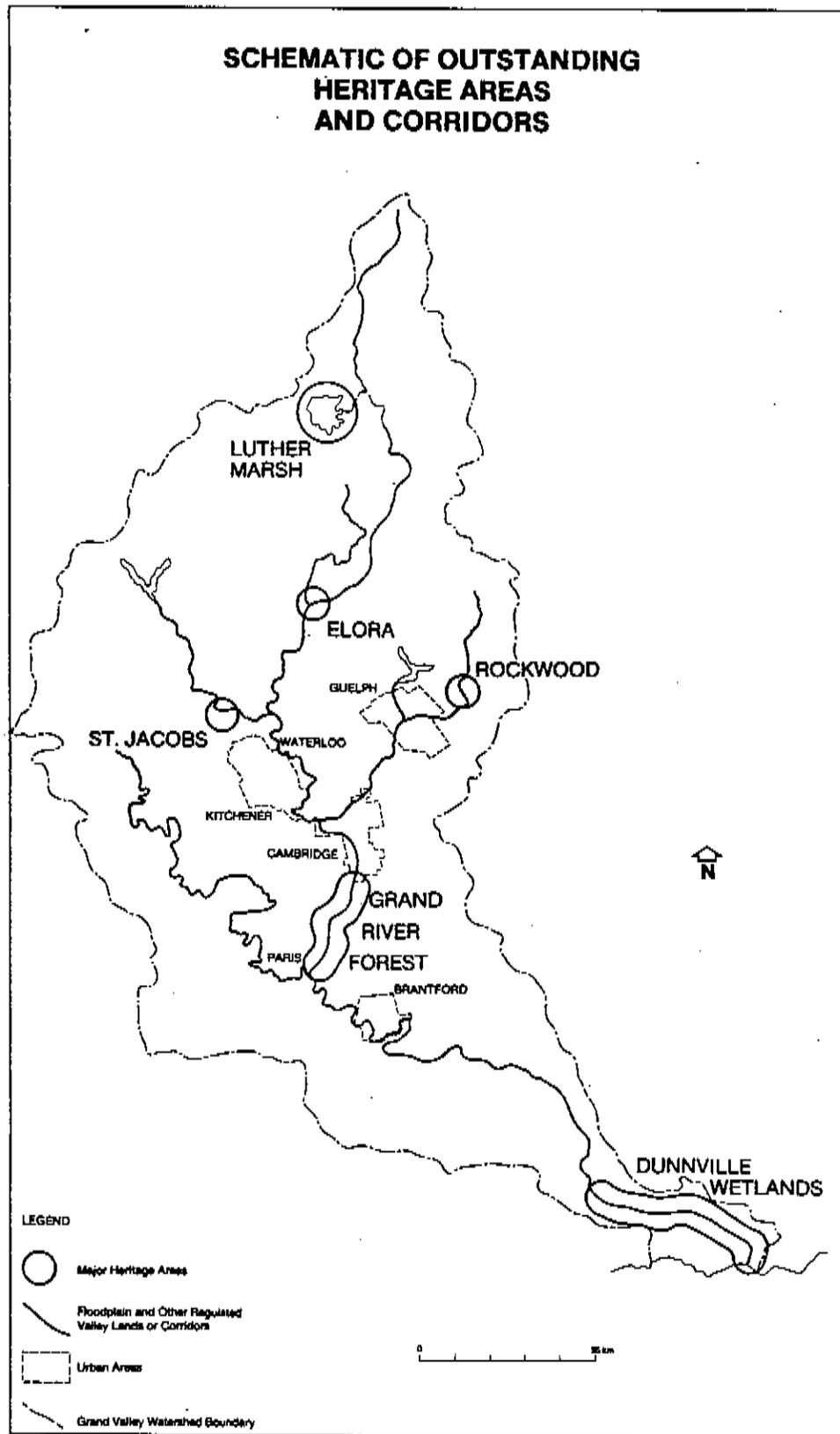


Figure 2

corridors is regulated by flood plan regulations and administered by GRCA in conjunction with municipal and provincial planning measures; in applying these planning tools special care must be exercised in regard to outstanding buildings and other human heritage. Management of the river pathways should be enhanced by completion of the corridor studies underway in the valley. These corridor studies essentially involve the identification of "green-lines" and a set of recreational and other uses appropriate to conservation and sustainable development.

5. Land use changes in the outstanding heritage areas as well as the connecting corridors, should be undertaken with due regard to their special qualities and with the aid of environmental appraisals and public comment for projects likely to have unwanted impacts. This procedure is similar to that now used to make judgements about changes in resource use in Environmentally Sensitive Policy Areas in Waterloo and Halton Regions. Comparable reviews are undertaken by the Grand River Conservation Authority (GRCA) in regard to developments on floodplain lands. The new Aggregate Act also calls for such appraisals where mining may have unwanted effects on environmentally sensitive or significant areas. In this regard the outstanding heritage areas along the Grand can usefully be labelled as Outstanding Heritage Policy Areas, indicating their high priority for management purposes.
6. In environmental appraisals careful consideration should be given to the prospects for timely and successful rehabilitation of heritage areas likely to be affected by aggregate mining and other development. Old growth forest, ancient buildings and other human artifacts are difficult to rehabilitate well. Wetlands may present more opportunities for rehabilitation or replacement by the construction of new ones, but much depends here on the biological diversity and sensitivity of the wetlands, and on how recreation, education, scientific, or other uses will be affected by the time needed for rehabilitation.
7. An opt-in system should be adopted whereby additional outstanding heritage areas and/or corridors could be added as local interest, resources, and circumstances permit. For example the native people on the Six Nations/New Credit reserve may wish to have an outstanding heritage area designated on part of their reserve in future. As another example, railroad lines are being abandoned at an increasing rate in the Grand River Valley as well as other nearby areas; some of these rail lines possess buildings, bridges, plant species, wildlife migration routes and other high quality heritage resources which may merit their designation as outstanding heritage areas or corridors in the near future. Another example would be areas such as the historic Doon village area in Kitchener which has a heritage conservation district plan but which has not been formally suggested as an outstanding heritage area by any participant in our open houses or studies to date.

VII. Information on Grand River Heritage

1. A more detailed and extensive information system on human and natural heritage and associated recreational and other values is needed in the Grand. All major heritage agencies should develop a heritage information strategy or policy which details the type of information to be collected, by whom, according to what schedule and for what market or distribution. These policies should be comparable to one another and should be promoted and co-ordinated by the GRCA. The information systems should include, among other things, general and technical information on different types of human heritage areas and sites, heritage themes, gaps in the system, land use stresses,

- recreational, and other uses. Study and consultations should occur among the GRCA and the municipalities, provincial agencies, and private organizations about the development of this information system. Area universities should assist, especially with the preparation and maintenance of a computerized Geographical Information System (GIS) which could be used to store heritage, recreational and other information on a constantly updated basis. This GIS should be supported by the GRCA in co-operation with other concerned agencies.
2. Every three years a State of Grand River Heritage Report should be prepared under the co-ordination of the GRCA; this report should contain key information on heritage conditions, trends, uses, and issues. It should be relatively brief, clearly written, and intended primarily for public discussion although it will also foster co-operation among all the major heritage agencies as they would be involved in its preparation and in the identification of issues. A suitable means for public discussion of this report and for advice to heritage agencies, planners, and politicians would be the citizen's Grand River Heritage Forum to be discussed shortly.

VIII. Implementing and Co-ordinating Heritage Planning and Management

1. The Grand River Conservation Authority, should accept responsibility as the lead agency in the planning and management of heritage conservation and recreation in the Grand Valley. GRCA should also be the agency responsible for the Canadian Heritage River program along the river. This is an appropriate arrangement because the GRCA has basin-wide responsibilities for natural resources other than oil, gas, and coal (Figure 1). It owns land in all parts of the watershed, many of the holdings being Conservation Areas established as the Authority undertook a recreation and heritage planning and management role in the 1950's. GRCA has large Conservation Areas in several of the outstanding heritage areas identified in the background studies of the Grand as a Canadian Heritage River (Nelson and O'Neill, 1989). These include Luther Marsh, Rockwood, Elora Gorge, and Byng Island in the Dunnville wetlands area. The GRCA also has land holdings in what is probably the outstanding heritage and recreation area in the valley, the Grand River forest. The GRCA is the premier co-ordinating agency in the valley, principally through its flood-control and water management programs. It also has major responsibilities in the review of land use applications, notably in the flood plains, wetlands, and steeply sloping hazard lands. GRCA also has a growing environmental education program and an extensive, well-organized, public relations program, with newsletters, videos, and a Conservation Foundation to provide assistance for conservation activities. As a result of all these roles and responsibilities the GRCA has the experience and the capacity to become the lead agency for implementing heritage river programs and for co-ordinating and facilitating the activities of the federal, provincial, municipal, and private groups interested in heritage conservation and use along the valley.
2. The GRCA should establish a Grand River Heritage Co-ordinating Committee which would consist of representatives of the agencies having major responsibilities for heritage in the valley. These agencies should include those with human and natural heritage interests as these two types of heritage are often closely intertwined, for example, in regard to recreation, education, and other uses. The GRCA should be the convener of this Committee and should provide secretarial support. The representatives on this Committee should be senior officials from the municipalities and the senior governments. A technical committee should be established as an

advisory committee to the Heritage Co-ordinating Committee. This technical committee should consist of individuals who have special expertise in various aspects of heritage as well as recreation, education, and associated uses in the valley. The Heritage Co-ordinating Committee should meet at least twice annually and should be responsible, among other things, for the distribution of the State of the Grand River Heritage Report. This preparation of this report would be the responsibility of the Secretariat which should seek assistance from area universities and utilize information from the GIS in its preparation.

3. The GRCA should appoint a Grand River Heritage Co-ordinator to serve as Secretary of the Grand River Heritage Co-ordination Committee and be the official generally responsible for the planning and implementation of Canadian Heritage River and associated heritage programs in the valley. Other major municipal and senior government agencies should also appoint heritage co-ordinators as has been done to date by Waterloo Region and Cambridge, among others. The Grand River Heritage Co-ordinating Committee should consider operating on a "floating chairmanship" basis, in accordance with the issues involved and the responsibilities and mandates of the agencies represented on the Committee.
4. To build awareness and understanding, a Grand River Heritage Interpretation program should be developed by the GRCA in co-operation with the major heritage agencies and groups. This program should focus on the major heritage themes identified in the surveys conducted as part of the Canadian Heritage River project, ie. the cultural mosaic, industry, native people, and the story of the human struggle with the river. Outdoor exhibits, museums, and mobile programs should be developed, keyed to major themes such as nineteenth century canals, the Loyalists, flood controls, milling, Carolinian vegetation and other major matters.
5. The GRCA should make this Canadian Heritage River Plan a part of its revised watershed resource management plan. In this way heritage matters will be integrated with overall resource planning and management carried out by the GRCA in association with other government agencies and private groups and individuals in the Grand River basin. The Canadian Heritage River plans for the Grand can also serve as the basis for any sustainable development approach put forward in the revised watershed resource management plan.
6. A citizen's group – The Grand River Heritage Forum – should be established and should meet at least once annually to discuss heritage matters, and especially heritage issues. Recommendations or suggestions should be sent to the Heritage Co-ordinating Committee or other appropriate groups, agencies, or officials for action. This citizens forum or round table should receive the Triannual State of the Grand River Heritage Report from the Heritage Co-ordinating Committee and should comment upon it for the benefit of responsible agencies and the public. The citizens forum should have major responsibilities for building public awareness of heritage in the valley and particularly for the Grand as a Canadian Heritage River. The citizens forum should publish a newsletter as well as other reports as necessary. A small amount of core funding for the forum should be provided by the Grand River Heritage Foundation. The Citizen's Forum should also work with local groups and the GRCA in the possible formation of a Heritage Trust or Trusts in the valley.
7. The Six Nations/New Credit people should be invited to take a prominent role in the foregoing management arrangements and should be supported in their efforts to develop a strong independent heritage, recreation, and tourist program for their reserves. No native heritage themes should be supported by the GRCA or the Grand River Heritage

Co-ordinating Committee without careful consultation with the Six Nations/New Credit people.

8. The GRCA should co-operate with the Heritage Resources Centre, University of Waterloo, in applying for Biosphere Reserve status for the outstanding landscape known as the Grand River Forest. This area has strong human heritage values and is especially significant as the largest relatively undisturbed area of forest and free flowing stream in the basin and probably in western Ontario. As deciduous or Carolinian forest, it is probably the leading area in Canada. As a biosphere reserve established under the international UNESCO program in Paris, the Grand River forest could be a focus for studies of natural processes and the way they are affected by human actions, past, present, and future. The results of these studies would increase our understanding of heritage and land use generally and be valuable in planning and management.
9. The Parks and Recreation Branch of the Ontario Ministry of Natural Resources should have a strong advisory role in heritage planning in the Grand River valley. The Branch should be the major liaison for the interests of the provincial government and particularly for the recreation, wildlife, and other responsibilities of OMNR. The Branch should be the agency which is responsible for providing provincial data on recreation and related matters to the GRCA and the Co-ordinating Committee. The Branch should be the main representative of the provincial government on the Heritage Co-ordinating Committee and in this role should assist with funding, monitoring, maintenance of a Heritage Resources GIS and in the preparation of the State of the Grand River Heritage Report. The Parks and Recreation Branch should work with the GRCA and other Ontario Conservation Authorities in developing a Heritage Plan as part of Conservation Authority management plans.



Heritage Resources Centre
Centre des ressources du patrimoine

Nominating the Grand as a Canadian Heritage River

Occasional Paper 13

University of Waterloo

Nominating the Grand as a Canadian Heritage River

Edited by
J.G. Nelson and Pauline C. O'Neill

A Study for the Canadian Heritage Rivers Board
and the Grand River Conservation Authority

April 1990

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SECTION II

Research Reports



The Human Heritage of the Grand River Valley: Approaches to Planning for Significant Areas

Deborah Dennis and Andrew J. Skibicki

CONTEXT

Acting as host to the movements and settlement of a wide assortment of peoples over the centuries, the Grand River valley has evolved into a landscape rich in diverse human heritage. Although the entire valley has an interesting heritage mosaic, several areas have been identified as being particularly outstanding in that they are representative of one or more significant themes closely associated with the Grand River and its tributaries. The purpose of this report is to identify and briefly describe these main outstanding human heritage areas as well as the institutional or management arrangements available to meet the challenge of conserving them for spiritual, educational, recreational, tourism and other uses in the future.

Due to time limitations and the large study area involved, this report cannot offer details on all aspects of human heritage nor suggest a complete list of management options to plan for human heritage resources. Neither can it claim that the areas identified as significant are the only ones to be found in the valley. Indeed, others undoubtedly will be seen as significant in the future. A basic purpose of this report is to set the stage for action and for greater recognition and co-ordination in planning for the human heritage of the Grand River valley.

PATTERNS

The Main Themes

In designing a conservation strategy for the human heritage of the Grand River, it is necessary to begin by identifying the historic themes considered to be important in the valley. Once these themes are recognized then the buildings or other resources which represent them can be identified throughout the valley. Indeed, the resources can be mapped and their spatial patterns and interrelationships used for planning purposes.

The 1988-89 Grand River heritage background study or resource inventory (Nelson and O'Neill, 1989) identified three important general human heritage themes. These are the cultural mosaic or diversity of peoples and cultures in the valley, the native people, and industry (Epp, 1989). The history of human adaptation to flooding and other aspects of the river regime was considered as a theme for the background study, but was not developed at that time. However, a report on this fourth major theme has been prepared as part of the current research and is included subsequently in this volume.

The cultural mosaic theme highlights the various ethnic groups or peoples coming into the valley from Europe and the United States in the eighteenth, nineteenth and early

twentieth centuries, including United Empire Loyalists, Mennonites, Germans, Scots, Irish, English, and displaced native peoples. Native history is a long and rich theme encompassing many thousands of years of human use of the Grand River Valley. The industrial heritage theme refers to the range of technical activities and structures associated with the development of transport and communications, energy, agriculture, manufacturing, settlement and other changes. Especially manifested in the valley are early water powered mills, nineteenth century factories and the nineteenth century navigation canal that linked Dunnville, Cayuga, Caledonia, Brantford, and Paris to one another as well as outlying places such as the Welland Canal, Buffalo, Hamilton, Toronto and Detroit. Some additional themes or subthemes in the valley include architecture and the culinary/crafts/artists heritage. Table 1 is a summary of some areas identified in the 1988-89 background study as manifesting outstanding heritage features associated with the river.

The theme of human adaptation to flooding and other aspects of river regime or behaviour highlights how people have attempted to deal with high flows and flood damages, low flows and pollution, and erosion, sedimentation and other problems. Dams, weirs, breakwalls and other technology have been used through the decades along with zoning and other regulatory or behavioural methods. These different types of human adjustments to the fluctuations in river flow are of considerable heritage interest in their own right and can be seen at many locations along the Grand River valley, for example Cambridge, Paris, Brantford and Dunnville. The various types of human adjustments to changing river behaviour are also of interest because of the effects they have had on historic buildings, river channels, vegetation and other aspects of heritage, as well as recreation and tourism. Various human adjustments to the river and their heritage and planning implications are dealt with in detail in the paper by Skibicki and Nelson in this volume.

A large array of laws, policies and programs have been developed over the years to provide for protection and appropriate use of historic buildings and other structures in valleys like the Grand. A general list of pertinent Ministries and Departments and laws, policies, programs and formal interest groups is presented in Table 2. Some of the more important legislation for human heritage planning and management in the valley is shown in Table 3. This table summarizes some details on this legislation, for example on agency/organization, programs, site designations, purposes, tenure, management procedures, monitoring and feedback, policy co-ordination, strengths, weaknesses and possible role in managing Grand River human heritage.

SIGNIFICANCE

Historic buildings, bridges, roads, and other features representative of the four major themes of the cultural mosaic, native peoples, industry, and human adaptation to the river, are scattered throughout the Grand River valley. All these artifacts from the past deserve thoughtful consideration when proposals are being made for developments which may change them in ways not wanted by some people. However, some features will be considered as more important than others because of their variety, high quality, good state of preservation or other reasons. Indeed many of the features have already been recognized or designated for such reasons by federal, provincial, regional or municipal agencies. Of particular concern in this report are the human heritage features which are considered to be outstanding at the federal or provincial level such as the former home of Mackenzie King at what is now Woodside National Historic Park or the Pauline Johnson residence on the Six Nations Indian Reserve.

Of special concern also in the context of Canadian Heritage River status are those areas which have been identified as unusually representative of the four outstanding human heritage themes in the Grand River valley. In the following paragraphs a number of these

outstanding human heritage areas are identified: Luther Marsh; Elora and Elora Gorge; St. Jacobs; the Cambridge to Paris area; and the lower river including the Six Nations Indian Reserve and the remnant locks and canals of the nineteenth century Grand River Navigation Company.

Generally, these areas have been selected because (i) they strongly represent one particular theme and/or they represent many themes within their boundaries; (ii) they have a large number of designated historic structures or structures that are of high architectural value; (iii) they offer walking and/or driving tours meant to enlighten visitors and local people about the human heritage of the area; (iv) they have ongoing human heritage conservation programs; (v) they have features which are protected by special zoning or other regulations; (vi) their features are linked to other heritage areas by open space, trails, abandoned railway lines or other corridors; and/or (vii) there is a strong interest among the local citizenry in promoting human heritage associated with the Grand River.

The identification and selection of these special areas was based on information in the 1988 background study or inventory (Nelson and O'Neill, 1989); the opinions of people who attended the 1988-89 Grand River heritage planning open houses at the Wellington County Museum, Cambridge, and Caledonia respectively; field checks; archival research and personal discussions with local residents and officials active in the heritage field. A few of the special areas have been mapped as examples to show human heritage resources, human heritage themes, and land use patterns.

Luther Marsh

Luther Marsh stands in sharp contrast to the rest of the basin in a variety of ways. Native use of this area apparently was quite minimal. European settlement occurred late because it was believed the land was not good for farming. Thus, progress was impeded by the swampy and wild landscape; however, like much of southern Ontario the area was settled by English, Scottish, Irish, and some Americans. At one time there was a black population which was connected to the underground railway. The area started as an agricultural community following the general pattern of mixed farming and only small communities evolved. Damascus became the hub of activity with its grist mill, blacksmith and wagon shops. Arthur, Grand Valley and Mount Forest served as market villages. After 1910 a decline in the rural population occurred as in other parts of the province.

Early settlers made maple syrup and were involved in forestry. By 1894 the forests were almost entirely consumed. Thus, sawmills were once a thriving industry. One of the first was built in 1868 near the large village of Conn. These mills were not located in the northern township. The pioneers hauled logs to the Grand River at Kaldon where they floated them down in the spring to a sawmill at Waldemar (Grand River Conservation Authority, 1976). Bank barns were built in the 1880s and became a part of the area's landscape. They tended to be large with stone or cement foundations. In 1878 drains were built which made the swamps "some of the finest and most productive lands to be found within its limits" (Historical Atlas of Wellington County, 1906: 8). Later on, rapid spring drainage and low flows in the summer, with associated downstream pollution problems, led the Grand Valley Conservation Authority (predecessor of the GRCA) to construct a dam in 1954 to even the flow of the river. As noted in more detail in the Skibicki and Nelson paper on human adaptation to the Grand, the dam and later improvements have greatly expanded the wetland environment for waterfowl and other animals and made Luther an outstanding recreation area for a variety of uses.

Elora and Elora Gorge

Elora is located at the confluence of the Grand and Irvine rivers. The mill potential of the Grand River Falls was the main reason this village existed. The first attempt at a settlement in the area occurred in 1817 but it was unsuccessful. In 1832 Captain William Gilkison, a native of Scotland, purchased part of Nichol Township and hired a surveyor; however, the death of Gilkison impeded the development of the village for a decade. Eventually, the village experienced growth and mills developed along the river (Figure 1). Retail and commercial businesses also flourished for a while, but once the railway came in the 1870s the town declined. This urban centre is an example of an industrial town that did not develop much beyond the waterpower age (Epp, 1989:90)(Figure 2). The town is currently known for its artistic and cultural affairs, its festivals and its recreation and tourism activities (Maps 1 and 2).

St. Jacobs

St. Jacobs is located in the Woolwich Tract and Block 3 of the alienated Indian lands. About 1807 Pennsylvanian Mennonites purchased the west half of Block 3 and sold it to fellow Pennsylvanian Mennonites. According to Virgil Martin, "most of the early settlement in Block 3 was simply an extension of the Mennonite settlement in Block 2, but it lagged by several decades." (Martin, 1979:31). In 1819 the family of Simon Cress settled in the vicinity of St. Jacobs. Previously, a Loyalist by the name of Captain Thomas Smith had settled in Block 3 but was unable to retain the land.

A significant role was played by Jacob C. Snider in the founding of St. Jacobs. Having the idea of a waterpower site on the Conestoga River in the mid-1840s, Snider bought land in 1847 and by 1851 he was running a sawmill and a woollen mill (Figure 3). A dam and a flour mill were in existence around 1852. Snider was joined by other men who ran commercial and retail businesses. The village served the commercial needs of the countryside and the Mennonite settlers. Although the two previous decades were prosperous, the 1860s witnessed some difficulties in the local woollen and flour industries and transportation as the railway bypassed St. Jacobs. Due to flooding and the need for more water power, a new dam was built in the 1860s along with a mill race. In the midst of these developments, the flour mill was sold to E.W.B. Snider who improved the technology of the mill and became a leading local figure. Snider Mill became the first Canadian mill to replace the traditional grindstone method with the roller (Epp, 1989:90). As a result, whiter flour was produced.

Cambridge (Hespeler, Preston, and Galt)

The city of Cambridge is made up of the three original communities of Hespeler, Preston, and Galt. Cambridge's desire to preserve its heritage is highly evident not only in numerous driving and walking tours but also in the functional use of historic structures (Figure 4). If today John Galt walked along the banks of the Grand River in the downtown core originally named after him, he would see flood walls, parks built amongst the ruins of old historic structures, and an old stone mill now used to house a restaurant (Figures 5, 6 and 7).

The two themes of industrial heritage and adaptation to the river regime have been used by the city to link human heritage with recreation (Maps 3 and 4). In other words the past is today used for recreation and education. The impetus for the development of the river bank came in 1974 with a destructive flood. The following are just some of Galt's significant examples of human heritage. The ruins of the old Turnbull Woollen Mill built in 1897 over the mill race

along the Grand River have been used to create Mill Race Park. Some of the early machinery remains in the race. Just beyond the park is the Dickson Mill built in 1843 as part of the mill race. From the mill there is a view of the 1837 dam which once powered both the Dickson and Turnbull Mills. In the late nineteenth and early twentieth century Dickson Mill was used by Galt's Gas and Light Company and since 1980 the restored mill has housed a restaurant (Figure 7).

On the southwest side of the Grand River there are further examples of Galt's industrial heritage. The pattern works are located on the banks of the Grand River, while across the street is the stone factory complex. Here wooden machinery patterns were manufactured. The solid stone industrial complex is a significant example of Galt's architectural heritage. Under the ownership of Goldie and McCulloch Ltd. the company became a national leader in boiler making and Ontario's largest foundry (Heritage Cambridge, 1988).

A mid-nineteenth century worker's cottage located near these industrial buildings is another example of Galt's industrial and architectural heritage. This historic structure is also an example of Cambridge's heritage program, as it was bought by the city in 1987 and then restored.

The original main street of Galt, then Shade's Mills, was located on the site of present-day Warnock Street which is only one block long. Along this street are former mill worker homes. These yellow brick 1870 and 1880 homes stand close to the sidewalk.

The oldest surviving textile mill in the area backs onto the banks of the Grand River (Heritage Cambridge, 1988). Built in 1843, the Galt Woollen Factory functioned until 1852 and since then has been and is presently used for a variety of purposes. This building is another example of the city's conservation and restoration of heritage. In addition to these industrial sites there are a great number of historic buildings and other manifestations of historic themes. For example in 1971 the Town Hall, an excellent example of the Italianate style, became a provincial historic site. Transportation history and its impact on Galt is brought to life by the former railway station of the Grand Trunk Railway Company located at George St. where the tracks once ran. The nearby commercial building (c.1850) is a significant example of Galt's early stone architecture. Absalom Shade once had a store at this location and in 1831 he conceived of a way to ship his store goods to a wider market. A flotilla of flat-bottomed boats were constructed and used to float goods down the Grand River to the Welland Canal. Known as "Absalom's Arks", they were 80 feet by 60 feet. Unfortunately, a variety of factors led to the demise of this venture (Heritage Cambridge, 1988). There are also several sites on the Old Galt Historical Walking Tour which represent aspects of twentieth century heritage. In Queen's Square, land set aside for the community by the founders, there are nineteenth century relics, World War I Memorial and the Centennial Fountain. In addition, there is the Portuguese Monument (1980) which represents a new aspect of the cultural mosaic theme; the Cenotaph (c.1928); Wren's Monument (c.1972) dedicated to the Women's Royal Canadian Naval Service; and the Carnegie Library (c.1905).

A block of commercial buildings in Galt have been designated as a Heritage District (Figure 8). These buildings form a historic streetscape in Ontario and they possess visual unity, a variety of architectural styles and a certain building age. The significance of this heritage block is due to its downtown location, size and architecture as well as the fact that it sets an example for the creation of heritage areas as well as building designation and planning in the Grand River valley (Hill, 1984:33).

Paris

The area surrounding the confluence of the Grand and the Nith was originally part of the land granted to the Six Nations, but in 1804 it was leased to Augustus Jones (Maps 5 and 6). The first settler, however, was William Holme, a wealthy Englishman who simply wanted to become a gentleman farmer. In 1828 Holme sold his land to a man whose enterprising spirit destined him to found a future settlement on this site. Hiram Capron was a fifth-generation American who first came to Upper Canada in 1822 (Byers, 1982:215). Upon his relocation to Paris in 1829, Capron had land surveyed, improved the overgrown Governor's Road and built a dam and races as well as plaster mills. From the outset, Capron intended to exploit the plaster beds along the Grand River (Figure 9). He was soon joined by such men as Norman Hamilton, Levi Boughton, Asa Wolverton, Zacharias Clump, Cephus Church and Ransom Rounds. These unusual names belonged to Americans who gave Paris one of its distinctive features, the presence of a number of American settlers. Some of these men became successful businessmen who not only boosted the town's growth but left behind large homes (Figure 10). Levi Boughton, a New York native, arrived in Paris in 1839 and, although little is known about his personal life, evidence of his work can be found in many of the buildings in and around Paris. Levi Boughton's architectural style gives Paris another distinctive feature, its cobblestone buildings (Figure 11). Local stone was used with the method requiring a large amount of construction time. In Paris and South Dumfries there are eleven houses and two churches of cobblestone, the largest assemblage in Canada.

The upper village was established first. Settlement tended to centre around the Governor's Road. Hiram Capron hoped that his town would experience growth due to its proximity to the road. Thus, the first homes, businesses and churches appeared in this part of the village. Over the years a shift took place from the upper village to the lower village. In his book *At the Forks of the Grand* (1956), Donald Smith attributes a large role to the influence of the rivers on the settlement of Paris:

"The Nith and Grand have had a very great influence upon Paris. Without the power developed by one or other of these rivers, there would have been no way of grinding either gypsum or the grain of the pioneer; or of sawing the logs that were floated down on the spring floods; or of driving the simple machinery of the first industries. And without this power, larger industries in later years would not have been established here. Without the rivers there would probably be no Paris." (Smith, 1956:88)

Smith also gives an inventory of the lower town industry in 1881. Such industries as Whitlaw's flour mill, a nut factory, a clothing factory, a woollen manufacturing company and knitting factories were all water-powered. In addition, the saw and planing mill used the Grand River to transport its logs. Between 1881 and 1920 there was an overall decline in the total number of industries in Paris in spite of the addition of four new ones. This decline was caused by a variety of factors such as flooding, fires or relocation to another area. The 1840s witnessed the beginnings of a new company, the Grand Valley Navigation Company, which ran steamboat excursions from Brantford to Dunnville. Parisians used this route to ship wheat and lumber down the Grand River on barges.

The next decade ushered in innovations in transportation and communication, and Paris was no stranger to them. The first train arrived in Paris in 1853 and three years later the Buffalo-Goderich line reached the town only to go bankrupt and cease operations until 1860. At the turn of the century the idea of an electric railway was born and by 1903 the Grand Valley Railway Company ran a line from Brantford to Paris to Galt. Much excitement surrounded this venture and it was frequently used by families on Sunday excursions which allowed them to

picnic on the banks of the Grand (Smith, 1956:224). Today, one can walk along this abandoned electric railway corridor past an old lime kiln and come to the old railway bridge lookout which still stands alongside the river (Figure 12).

Lower River

In 1825 Dunnville was settled and within two years the construction of the Dunnville dam or weir had begun. In 1829, a decision was reached to construct a feeder canal which would support the first Welland Canal. This feeder line regulated the flow of the Grand River and made it possible to build a canal on the Grand River. By 1832 the level of the Grand River had increased by nine feet as a result of the dam (Joanette, 1986:55). The feeder went from Dunnville to Broad Creek. A cut was made from Broad Creek to the Grand River and the stone lock at Broad Creek. This allowed direct passage of vessels from the upper Grand River to Lake Erie. Throughout the 1830s and 1840s the feeder was improved and alternated between periods of local traffic and trans-shipment. It is believed that the feeder canal officially closed in 1881 and it was last used in 1908. Dunnville itself boasted four saw mills and a significant lumber industry.

In 1832, the Grand River Navigation Company came into existence and undertook the task of building canals and locks along the Grand River (Figure 13). As a result, villages along the river such as Cayuga, Caledonia and Brantford experienced growth and new villages appeared such as York and Indiana. This industrial heritage is represented today by the Caledonia Mill built c.1850 and run by water power until the 1960s. It is also represented by the ghost town of Indiana whose only remnants consist of a few large houses which stand among the weedy lots of the old main street.

The lower river area has strong representations of the native theme. Major resources include the Mohawk Chapel, the Mohawk Institute, Brant's Ford, Chiefswood, the Salt Springs Church, and the Six Nations and New Credit Indian Reserves (Figure 14). The Six Nations Indians left their land holdings in New York State as Loyalist refugees following the American Revolution to become the first major peoples to settle in the Grand River basin since the days of Neutral Indian occupation, which ended in about 1720 after a war with the Iroquois. The Haldimand Grant of 1784 entitled the Six Nations peoples to land holdings from the mouth to the upper reaches of the Grand River. Eventually, the Six Nations peoples sold off major portions of their land holdings to businessmen who resold them to later settlers such as the Mennonites and Scots. Many well-known native and European personalities emerged from this historical landscape. These include Joseph Brant, the great Six Nations leader; E. Pauline Johnson, the famous poet; and Rev. Peter Jones, the Ojibwa missionary (Epp, 1989:87).

STRESSES AND CONSTRAINTS ON HUMAN HERITAGE PROTECTION AND APPROPRIATE USE

Introduction

Stresses refer to housing, aggregate mining, road or other developments which could damage or destroy historic buildings, old canals, or other human heritage resources which are highly valued by some citizens. On the other hand, such stresses or land use changes should not be viewed as always negative because with appropriate planning they often can bring more employment, improved recreational opportunities or other benefits to a community, without major adverse effects on heritage resources.

Constraints refer to factors that inhibit the kind of planning which will allow for both a high level of protection and appropriate use of human heritage resources, and economic developments which contribute to community well-being. Examples of such constraints are lack of suitable laws, policies, government agencies or citizen support groups; insufficient staff and funding to monitor, plan for and manage heritage resources; and lack of information and communication systems which will promote a broad approach to heritage use and conservation. More details will be given on these concerns later in this report.

Stresses

As the information in this volume shows there are many stresses on the human heritage resources in the Grand River valley. Generally, these tend to be relatively low in the upper basin, for example in the vicinity of Luther Marsh. Somewhat higher stresses exist in the Elora and St. Jacobs areas, in part because of increasing demands for housing, but also because of pressures from recreation and tourism. Quite high and diverse levels of stress exist in the growing urban centres of Waterloo, Kitchener, Cambridge, Guelph and Brantford. Relatively low stresses exist in the lower river, including communities such as the Six Nations/New Credit Reserve, Caledonia, Cayuga, and Dunnville (Nelson and O'Neill, 1989; Skibicki and Hammond, 1989). In the lower river up to Brantford, there is a strong push for recreation and tourism as part of a general development thrust in an area not recently viewed as very healthy economically. Many benefits can occur from such recreation and tourism development, but care is needed to ensure that the outstanding human and natural resources upon which these activities are dependent are safeguarded in the future. In other words, the development should, so far as possible, be sustainable.

Constraints

Many laws, agencies, policies, special areas and other institutional arrangements are available to promote, protect, and appropriately use human heritage resources. Tables 2 and 3 illustrate these. These institutional arrangements have been used as effectively as might be expected to date. However, stresses are accelerating and some improvements are desirable. One suggestion is to expand thinking from a focus on protecting single historic or human heritage features such as buildings to larger areas such as heritage districts.

Few municipalities or other agencies have successfully introduced and implemented this larger scale management thinking, the leading exceptions being Cambridge and Kitchener. It is very important to recognize that areal or district thinking will not only help to protect more important individual buildings or features but will add to the overall experience or impression people derive from historic and architectural resources by retaining much of the flavour of the historic environment in which individual buildings or other heritage sites were actually located in the past. Another major current need is for improvements in the strength of existing laws, policies and procedures, including planning, inspection, implementation and ultimately funding. Improved information and communication is also needed among interested parties and the public. Better joint planning and co-ordination is also needed across jurisdictional lines in the future. An outstanding example in regard to human heritage resources is the lower river, where, for example, the old nineteenth century navigation canal runs through Haldimand-Norfolk, the County of Brant, and many municipalities and communities. Stresses are creating opportunities for problems and development in large parts of the valley, and a more comprehensive management system seems to be required in response. More specific discussion of these general points will now be made for outstanding human heritage areas.

ISSUES AND PLANNING

Current Human Heritage Conservation Strategies

Luther Marsh

The townships of West and East Luther lack a township-based organization such as a Local Architectural Conservation Advisory Committee (LACAC) to recognize and promote human heritage features in the area; however, local involvement is prominent in small communities such as Grand Valley, which has its own LACAC. The Wellington County Official Plan recognizes the increasing importance of tourism based on the scenic countryside and recreational facilities offered in the area and encourages its development (County of Wellington, 1986).

Elora and Elora Gorge

A walking tour by the Elora LACAC points out some of the significant buildings and homes on both sides of the river. Some of these sites bear a local plaque which signifies that they are one hundred or more years old. Several other individual structures such as the Victoria Street bridge and the Tooth of Time have been designated under the Ontario Heritage Act. The town is presently in the process of drafting a new official plan which will make provisions to designate Heritage Conservation Districts. The idea of designating a street has been considered but it is still in the conceptual stage. The part of Mill Street west of the Metcalfe bridge is the oldest section of the street and, therefore, most likely to be designated as a Heritage Conservation District.

Both of Elora's railway lines are now abandoned and the tracks have been removed. There is interest within Elora in using these natural corridors as trails (Thorning, 1989). The theme of adaptation to the river regime is represented in Elora by the nearby Shand Dam. Before its construction, low river levels had been a problem in Elora during the summer months. Many of the village's original bridges were destroyed by flooding.

Open space zoning links human heritage resources areas in the Village of Elora with the unique recreational and natural heritage features of the Elora Gorge, which is a Grand River Conservation Authority Conservation Area (Map 7). Elora thus represents an area where corridor linkages between heritage resources have been quite well developed through zoning and the efforts of various agencies and heritage interest groups.

St. Jacobs

The township LACAC provides a walking tour of St. Jacobs but has not designated any buildings. Several files have been prepared on the historical and architectural significance of houses and businesses in the town. Many of the significant buildings have experienced extensive renovations or additions. Interest in conserving the community's heritage does exist; however, the lack of resources such as legal expertise and time restricts effectiveness.

Cambridge

Approximately sixty-three individual heritage sites have been designated by Cambridge's LACAC and many others have been identified as buildings of historic and/or architectural significance. Heritage Cambridge has published walking and driving tours for Galt, Hespeler, Preston and the area of Blair. The idea of rehabilitating historic structures for commercial or recreational use has been well developed in the city. In fact, the human heritage has been effectively linked with recreation as evidenced by the numerous riverfront parks along the banks of the Grand River (Map 8). The preservation of industrial heritage includes old flour

and textile mills but it also includes more diverse types of industries, particularly manufacturing. The theme of industrial heritage has been historically neglected in conservation efforts, particularly the manufacturing theme.

Like Paris, Cambridge is linked to the Grand River Forest, located just to the south, by the Grand Valley Trail, an abandoned railway line and an auto tour. In Cambridge the emphasis has been on recognizing significant individual buildings; however, a block of commercial buildings in downtown Galt has been successfully designated as a Heritage Conservation District.

A further interesting aspect of the area's human heritage is the Portuguese and other elements of twentieth century heritage discussed previously. These illustrate more contemporary themes such as modern warfare, immigration, flood adaptation and the women's movement.

The current system to protect heritage sites in Cambridge has some obvious strengths but also some weaknesses. Although there is a by-law on title, designated buildings can still be demolished. The policy is being updated, and this issue has been addressed and may be changed (Springs, 1989). Some further weaknesses are the subjective nature of the drafting of by-laws and the lack of instruction on the nature of this task as it pertains to human heritage. The Heritage Conservation District is considered a strength overall; however in this case, because the area is commercial, one must deal with the tenants and not the person who has a vested interest in the property.

The overall strength of Cambridge's heritage is attributed to a city council with a tradition of supporting heritage conservation, a permanent, full-time heritage staff position and the realization of the benefit of heritage to the local business community. Finally, two very strong groups, LACAC and Heritage Cambridge, which is a branch of the Architectural Conservancy of Ontario (ACO), play a large role in the preservation of human heritage in Cambridge.

Paris

The current system which protects heritage sites in Paris could be strengthened (Legatte, 1989). Presently, the Paris Heritage Society or LACAC is the only organization which plaques buildings locally. Thus, heritage sites receive protection from organized citizens; however, no formal protection, other than plaquing under the Ontario Heritage Act, exists. According to a local planner, other concerns and issues take precedence over conserving the town's heritage. Two other weaknesses identified include difficulties some homeowners face in conforming to provincial standards for the upkeep of sites designated under the Ontario Heritage Act, and the lack of concern once any additions or defacement have been made. If a heritage site has no use, no plaque exists and there is no outcry from the community, then preservation usually does not occur. Presently, the demolition of a Penman factory, once the main industry of Paris, is underway. The area had been rezoned to a residential area but it later became apparent that it would be financially impossible to convert the buildings. This situation is a good example of problems with the protection system from a preservation standpoint, for once a developer gets the area rezoned there is nothing to keep the developer from applying and receiving a demolition permit (Legatte, 1989).

The community's failure to support a proposed Heritage Conservation District was cited as an example of the desire on the part of the citizens to decide for themselves what they want to do with their property. This district consisted of approximately thirty-one buildings, many of which were built by the town's forefathers. Most were built between 1860 and 1922 and several share common architectural features (e.g. buff brick). Thus, this proposed district

offered a link to some of the prominent settlers and would depict a certain time period in Canadian history. The citizens of Paris did not support this proposal because they believed that the current R1 zoning was adequate (Map 9)(Legatte, 1989).

Lower River

Human heritage in the lower Grand River valley holds a great deal of importance to local citizens who have been active in preserving and commemorating their heritage. The York Grand River Historical Society, along with Heritage Haldimand, are just two of the organizations involved in conserving heritage. Presently, they are trying to preserve the Grand River Mill at Caledonia which was connected with the Grand River Navigation Company. A major issue that needs to be addressed in the lower river is the involvement of the Six Nations native peoples in managing the river as a Canadian Heritage River.

The idea of refurbishing the old canal system could serve not only educational purposes but also recreational ones. For instance, the remnant double tow path along each bank of the canal could serve as a regional bikeway from Dunnville to Welland (Bradley, 1975). However, this interest will bring a variety of pressures to bear on the environment in the lower river. Although Dunnville has expressed an interest in developing new marinas and a lock, much care would need to be taken in developing such projects. In 1815 a Naval Reserve was established in Sherbrooke Township near the mouth of the Grand River. Abandoned in 1834, the land was finally sold by the government to a railway company which has leased some of the land to cottagers. One report raised the possibility of restoring the naval base and creating a naval museum (Bradley, 1975). This would require considerable funding and the repurchase of private lands. A problem around Dunnville is also posed by the industry which has been established along the waterfront. More research into the implementation of these ideas is needed before further recommendations can be offered.

Management Proposals

The purpose of this section is to suggest possible management approaches to address issues of concern in human heritage conservation, and to conserve the human heritage resources of the Grand River valley and the valley-wide themes upon which they are based (see Appendix A).

Communication

There is a need for greater levels of communication and interaction among human heritage conservation groups and organizations in the valley to promote recognition of valley-wide heritage themes. As the situation stands, liaison among many historical societies and LACACs is infrequent at best. At the regional government level, the regional heritage foundation keeps close contact with the local historical foundations, societies and chapters of the Architectural Conservancy of Ontario. In the Regional Municipality of Waterloo there has been an attempt to develop a regional archives complex to bring together the archival materials from member municipalities (Waterloo Regional Heritage Foundation, 1989). At the county government level, however, this interaction on human heritage issues is frequently missing among constituent municipalities and townships. Also, little interaction is evident between regional governments and counties and among counties on human heritage issues.

Areas and Landscapes

Municipalities should more strongly recognize the need to protect the integrity of human heritage areas or clusters of significant human heritage structures by considering protection strategies that focus on areas or landscapes. Part V of the *Ontario Heritage Act* provides

municipalities with the option to designate Heritage Conservation Districts. Municipalities may also use land use zoning or design by-laws to protect buildings in certain areas from defacement or alterations which destroy the historical period or cultural essence that the area embodies, and to require businesses to introduce signs or building constructions that are sympathetic to the human heritage theme embodied by the area. Promoting the availability of heritage conservation easements, the Designated Property Grant, the Corporate Sector Grant and other financing and grant programs may make it easier for businesses and interested parties to participate in developing the historical, architectural and cultural attributes of an area. Local government may further help in preserving the heritage aesthetics of an area by providing tax incentives or exemptions to persons who renovate significant human heritage buildings in such a district.

Incentives and Support

The role of the federal government may be limited in providing direct protection to heritage sites, but its role in providing incentives and research support may be increased in the valley. The Canadian Parks Service could become more involved in the basin from its facility at Woodside National Historic Park, the former house of Mackenzie King. The *Income Tax Act* has the potential to provide tax incentives or exemptions for the renovation of buildings and existing heritage structures. Tourism Canada could work more closely with local municipalities in the basin in promoting various aspects of local history outside the community. Tourism Canada could assist in promoting the valley-wide themes which are found in the valley.

Human Heritage Registers

The role of regional and county governments may be expanded in the research and promotional areas. Regional and county governments in the valley, in co-operation with local chapters of the Architectural Conservancy of Ontario and local historic societies, can assist in compiling a regional or county register of significant human heritage resources found in constituent municipalities. Linked together, the registers could provide a valley-wide register of human heritage resources available to researchers, historical societies, and the interested public.

Monitoring

A Geographic Information System (GIS) may be used as an efficient data acquisition and manipulation tool. Information on significant human and natural heritage resources can be combined with current zoning, land use, and regulatory information to help identify and plan for valley-wide heritage. With this information, integrated mapping may also be done to monitor the state of Grand River heritage resources. This information could be distributed on a regular basis to concerned governments and private organizations.

APPENDIX A

A Human Heritage Conservation Tool Kit

Heritage conservation techniques must operate within the complex governmental structure in existence in Canada. The *British North America Act, 1867*, delegates exclusive jurisdiction on certain issues to the federal and provincial governments. In the case of issues pertaining to property and civil rights, for example, the provinces have exclusive jurisdiction. Thus, in the protection of human heritage properties such as significant buildings, the role of federal human heritage protection programs in most of Canada is primarily limited to research, supervision of properties, and finance; while provincial programs play the more powerful role of providing legal protection to these properties and setting down policies, procedures, and guidelines for local levels of government (Denhez, 1978: 12).

Unlike most countries, the federal government of Canada is not normally bound by any laws its provinces may set down. Therefore, the federal government is under no legal obligation to acknowledge or respect provincially designated heritage sites although the moral support for such sites may be there (Denhez, 1978: 15).

This Appendix describes the range of human heritage protection tools and strategies available in Canada to conserve human heritage resources. These tools and strategies include: (i) federal and provincial legislation; (ii) land use controls; (iii) incentives; (iv) research programs; (v) promotional programs; and (vi) international agreements.

FEDERAL AND PROVINCIAL LEGISLATION

The federal government's legal activity regarding historic sites is constitutionally limited to property it owns or acquires, property in the territories, property officially declared to be for the general advantage of Canada, and property which forms part of a federal undertaking. The provinces have exclusive jurisdiction over questions of property and civil rights, leaving the federal involvement on heritage matters to be mostly in the areas of research, property supervision, and financing or promoting heritage related activities (Denhez, 1978: 12).

Federal Human Heritage Legislation

The Historic Sites and Monuments Act (Canadian Parks Service, Environment Canada)

This is the most important federal statute with regard to heritage, and can be applied to almost any property in Canada. The legal effect with regard to general property is diminished since the Minister of the Environment has no jurisdiction over an owner's property rights and therefore cannot prevent alterations or demolition of the property. Using this Act, however, the federal government can acquire or purchase properties and thus put them under its jurisdiction. The federal government can thus legally prevent alteration or demolition of such sites. The weakness of this approach is that property purchase costs limit the number of sites that can be protected in this manner (Denhez, 1978: 13). Usually, only nationally significant

sites or structures are chosen, thus ignoring a large number of provincially and locally significant heritage features.

The National Parks Act (Canadian Parks Service, Environment Canada)

This Act enables the federal government to create national historic parks, such as Woodside National Historic Park in Kitchener. Again, the weakness of this approach is that only nationally significant sites are preserved and local areas and structures are ignored. The strategy also tends to isolate designated buildings from the surrounding living communities by creating a natural or open space enclave (Dalibard, 1986).

The Railway Act (Transport Canada)

This Act enables the Canadian Transport Commission (CTC) to supervise railway operations. This gives the CTC the power to issue orders for the protection of property and thus indirectly to protect railway-associated heritage sites or structures from demolition or alteration by railway companies or other agencies.

The Income Tax Act (Department of Finance)

This piece of legislation has had a history of indirectly encouraging the demolition of heritage structures by property owners (Denhez, 1978: 18). However, it has the potential of being used to provide tax incentives to renovate existing heritage structures (Dalibard, 1986).

The Indian Act (Indian and Northern Affairs Canada)

This federal agency has played an important role in protecting and promoting the heritage of Canada's native peoples. The *Indian Act* controls the transfer of title to native grave houses, carved posts, pictographs and petroglyphs on native reserves and protects these human heritage artifacts from destruction (Landals, 1988).

Provincial Human Heritage Legislation:

The Ontario Heritage Act (Ontario Ministry of Culture and Communications)

Delegates demolition and alteration controls that were previously the subject of individual municipal acts to all municipalities under a more coherent administrative system (Regional Municipality of Waterloo, 1986). Has a wide involvement in human heritage conservation in all areas: (i) allows municipalities to form Local Architectural Conservation Advisory Committees (LACACs) to aid officials and private actors in identifying and protecting local heritage structures; (ii) provides for the designation and plaquing of locally or regionally significant historic or architectural structures; (iii) provides for the designation of Heritage Conservation Districts by municipalities; (iv) provides for the protection of the province's archaeological heritage; and (v) provides financial assistance and arrangements to private individuals and groups for restoration and conservation work. Subject to the *Expropriations Act*, the OHA may also pass by-laws to expropriate a designated property if the need is warranted. Has limitations in that individual heritage buildings can be protected for only 270 days after being slated for demolition.

The Ontario Planning Act (Ontario Ministry of Municipal Affairs and Housing)

Permits municipal governments to refuse a demolition permit on a dwelling in a zone indefinitely if the applicant refuses to guarantee the replacement of the structure by another

one within a period of two years. Can protect a structure from being demolished for the establishment of parking lots or speculative reasons (Denhez, 1978: 109).

The Environmental Assessment Act (Ontario Ministry of the Environment)

Requires public authorities to submit a detailed assessment of the impact of a public work on the environment including cultural property. Also applies to projects undertaken by private organizations. A problem with this legislation is that projects which "retire" (demolish) a building are exempt from an environmental impact assessment. It has therefore been pointed out that this legislation has no more power to save human heritage features than some federal legislation (Denhez, 1978: 87).

The Historic Parks Act (Ontario Ministry of Tourism and Recreation)

Allows the Lieutenant Governor in Council to set apart as a historic park any public lands in which there is an object, site or land of historical significance for use by the people of the province in connection with their enjoyment of such resources. Similar to the *Provincial Parks Act* of the Ontario Ministry of Natural Resources which protects naturally significant resources.

The Conservation Authorities Act (Ontario Ministry of Natural Resources)

Evolution of this act since the 1940s has provided funding to allow conservation authorities to restore old mills on flood-prone lands, to undertake programs to create and manage parks and to undertake landscaping projects.

The Cemeteries Act (Ontario Ministry of Consumer and Commercial Relations)

Provides protection against the alteration of crematoriums, columbariums and mausoleums. Also prohibits the destruction of tombs, monuments, gravestones or other structures or any fence or other work protecting or ornamenting a cemetery including trees and other plants. Requires the council of every county to appoint a War Memorial Committee to take charge of monuments, tablets and other memorials that are not being taken care of by municipalities, churches or other organizations.

LAND USE CONTROLS

Federal Involvement

*The Federal Advisory and Co-ordinating Committee on Heritage Conservation
(Canadian Parks Service, Environment Canada)*

An intergovernmental committee composed of senior government officials, the FACCHC may be called upon to address environmental impact assessment matters related to heritage sites. The FACCHC has been established as an administrative procedure to deal with environmental impact assessments since no legislation exists at the federal level which requires the preparation of environmental impact assessments for projects in which federal agencies are involved (Denhez, 1978: 13).

The Environmental Assessment and Review Process (Environment Canada)

A procedure used to review most other types of public works projects which can have detrimental effects on the environment. The procedure enables civil servants to commission studies to review the impact of various projects (Denhez, 1978: 14).

Provincial Involvement*Ontario Ministry of Culture and Communications*

Has developed a position which seeks municipal Official Plan policy recognition of heritage resources interests and provides general guidance for protection of such resources (Regional Municipality of Waterloo, 1986). The Ministry's position is that: (i) Official Plans acknowledge the existence of heritage resources and protect them during the development approval process; (ii) in protecting heritage resources under Parts IV and V of the OHA, the Official Plans establish policies to support these activities using such procedures as zoning by-laws, bonus zoning, site plan control, sign by-laws, severances, neighborhood planning, and subdivision procedures; and (iii) that Official Plans acknowledge the existence of archaeological resources and make a commitment to their protection (Regional Municipality of Waterloo, 1986).

Heritage Conservation Easements (Ontario Heritage Foundation)

Also known as protective covenants. These are binding agreements made under the Ontario Heritage Act between a property owner and the easement holder and are intended to protect a heritage property against disfigurement and demolition no matter how many times it changes ownership. An agreement can be signed for a specific term or can run perpetually. Power to enter into such agreements is given to the Ontario Heritage Foundation and to local municipalities (Galt, 1982). Easements tend to provide stronger protection against the destruction of significant heritage structures since they are more comprehensive, thus enabling specific agreements to be made on maintenance, insurance, and repairs (Ontario Ministry of Citizenship and Culture, 1983).

Municipal Involvement

Municipalities have the power to enact land use controls by enabling legislation passed at the provincial level (Denhez, 1978: 110). The principal legislations through which these land use controls are implemented are the *Planning Act* and the *Municipal Act*. Through its Official Plan and the use of zoning by-laws, a municipality can maintain the integrity of a significant heritage structure or area. Fines or court injunctions are used by municipalities against violators to enforce by-laws (Denhez, 1978: 115).

Zoning By-laws

The most widely used land-use tool available to municipal governments. Useful for controlling construction in certain areas of a municipality and setting density limits on any new construction (Diamont, 1987). Limited in that they do not have a retroactive effect. In other words, a new by-law cannot force a property owner to remove or alter a structure (Denhez, 1978: 110).

Design Related By-laws

Empower a municipality to: (i) control bulk, height, and use of buildings; (ii) compel landowners to maintain or rehabilitate dilapidated buildings; (iii) control the set-back of buildings in a streetscape; (iv) control the design of structures; (v) control the design of signs outside structures; and (vi) control the landscape of an area through the planting of trees and shrubs. These design related by-laws have perhaps the most important role in maintaining the heritage landscape of groups of buildings and designated heritage districts (Denhez, 1978: 112).

INCENTIVES

Federal Involvement

The Income Tax Act (Department of Finance)

Has the potential of being used to provide tax incentives or exemptions to renovate existing heritage structures (Dalibard, 1986).

Provincial Involvement

The Corporate Sector Grant

Entitles businesses or individuals to grants for work done on designated properties of a commercial or industrial nature.

Municipal Involvement

Designated Property Grant (OHA)

Entitles property owners to a maximum grant of \$3,000 per year for work done on the heritage elements of a designated heritage property. The amount received from the grant is to be matched by the property holder. This program is administered by municipalities through an agreement with the Ontario Ministry of Culture and Communications. Eligibility for the grant is determined by the municipal council on the advice of the municipality's LACAC (Ontario Ministry of Citizenship and Culture, 1983).

Property Tax Incentives

Reductions in property taxes can be provided to owners who forego development of their property or donate control of ownership of it to a conservation agency or organization (Diamont et al., 1987). The property must be officially recognized as being of cultural or historical value.

PROMOTIONAL AND RESEARCH PROGRAMS

Federal Programs

Canadian Inventory of Historic Buildings (CIHB)

A listing of 198,000 significant historic buildings in Canada that is stored in a central computer. The information is open to anyone doing research. The CIHB is the closest thing Canada has to a national register of heritage structures. The Canadian Parks Service attempted to develop a national register some time ago, but the project was abandoned after the agency was told by the federal government that such a register was not part of its mandate (Dalibard, 1986).

National Museums of Canada (Communications Canada)

Funding comes from Communications Canada, which also promotes associated museums, national exhibition centres, travelling exhibits, a national loan collection, an inventory of major museum holdings, a catalogue assistance program, and the Canadian Conservation Institute (Dalibard, 1986). Legislation in 1987 dismantled the National Museums of Canada as a crown corporation and created, through legislation, four autonomous organizations (The National Gallery of Canada, The Canadian Museum of Civilization, The National Museum of Natural Science, and The National Museum of Science and Technology)(Ministry of Supply and Services Canada, 1988).

The Heritage Canada Foundation

A non-profit, charitable foundation established to facilitate a national movement to maintain for Canadians a sense of place and a sense of continuity. This is accomplished by networking, demonstration projects and marketing. The Foundation is financed by a federal government endowment and consists of a Board of Governors composed of representatives from the Canadian Parks Service, the National Museums of Canada, and regional representatives. The Foundation offers two national preservation awards and publishes Canadian Heritage magazine, but does not provide grants.

Tourism Programs (Tourism Canada)

Tend to concentrate mainly on transportation, accommodation and the promotion of generally well-known and obvious tourist attractions. Have tended to ignore the interest of visitors in history, museums, heritage buildings, people, and local traditions. It has been recommended that Tourism Canada work closer with various heritage agencies in constructing its promotional programs (Dalibard, 1986).

The Canadian Heritage Rivers System (Canadian Parks Service, Environment Canada)

Objectives are to give national recognition to the important rivers of Canada and to ensure their future management such that natural heritage, human heritage, and recreational opportunity values associated with the river are realized by residents and outside visitors. The program involves the participation of the various levels of government in nominating, operating, and managing a heritage river. The Canadian Parks Service participates in and encourages the establishment, growth and public awareness of the System (Parks Canada, 1984).

Provincial Programs

The Ontario Heritage Foundation (Ontario Ministry of Culture and Communications)

An agency committed to preserving, protecting, and promoting the province's cultural, archaeological, architectural, historical and natural heritage. Provides technical assistance and financial support to private individuals and groups involved in heritage preservation. Is also involved in operating the province's historical plaquing program and in accepting, holding in trust, and maintaining any gifts or donations of culturally significant property or articles on behalf of the people of Ontario. This includes the use of heritage easements on significant properties (Ontario Ministry of Citizenship and Culture, 1983). The Foundation operates under the OHA and is directed by a board of private citizens. Support is provided by staff from the Heritage Branch of the Ontario Ministry of Culture and Communications (Ontario Heritage Foundation, 1988).

Municipal Programs

Local Architectural Conservation Advisory Committees (LACACs)

Appointed under the OHA, the purpose of LACACs is to advise and assist municipal governments on matters relating to the conservation of historically and architecturally valuable buildings, structures, and heritage districts. They are also involved in surveying significant heritage resources in communities, promoting these resources with exhibits, publications and/or pamphlets, and bringing out the interest and concerns local residents have towards their heritage (Ontario Ministry of Citizenship and Culture, 1983). LACACs exist in Grand Valley (Luther Marsh area), Elora, Woolwich Township, Cambridge, North and South Dumfries Townships, Paris, Brantford, and Haldimand Township.

Local Historical Societies

These are excellent sources of historical information about local communities, also active in educating the public and providing advice to LACACs. They can also advise individuals on assessing the historical significance of their properties.

Architectural Conservancy of Ontario (ACO)

A society established for the preservation of the best examples of the architecture of the province and for the protection of its places of natural beauty. Local chapters of this society provide information on significant architectural buildings and structures in a community to the public and the LACAC, and participate in the identification of significant architectural structures.

Others:

Local ethnic or cultural organizations
Ontario Historical Society
Ontario Archaeological Society

INTERNATIONAL AGREEMENTS

As a member of the world community, Canada has become involved in the international commitment to preserve human heritage resources led by the United Nations Educational, Scientific and Cultural Organization (UNESCO). This has resulted in Canada's entry into formal commitments to protect human heritage features, commitments which have legal consequences on the international stage.

The Hague Convention (1954)

An international and legally binding agreement signed by a number of countries, providing for the treatment of historic monuments in times of armed conflict (Denhez, 1978: 4). Although Canada did not sign, heritage sites designated in this country enjoy some form of theoretical protection and recognition from the international community.

The UNESCO World Heritage Convention (1972)

Under this agreement, Canada's federal, territorial and provincial governments (except Quebec) pledged to recognize their responsibility to the international community for ensuring that cultural and natural heritage within their boundaries will be identified, protected, conserved, presented, and transmitted to future generations. Canada also agreed to: (i) adopt a policy to give cultural and natural heritage a function in the life of the community and to integrate its protection into comprehensive planning programs; (ii) set up well-staffed services to protect, conserve and present cultural and natural heritage; (iii) develop scientific and technical methods to counteract threats to heritage; (iv) adopt various other financial, legal and administrative measures towards identifying, protecting, conserving, presenting, and rehabilitating heritage; and (v) recognize the international co-operation needed to meet these goals (Denhez, 1978: 5).

Recommendations

Canada has also followed a series of recommendations for governmental action on heritage conservation periodically agreed upon by UNESCO. These recommendations are not legally binding and are intended to advise countries of the opinions of the international community. However, they do create a useful checklist with which to assess the performance of government programs and to plan for future government activities (Denhez, 1978: 5).

Programs

The Man and Biosphere Program (MAB)(UNESCO)

Primarily a natural heritage program designed to designate representative ecosystems of international significance. However, it also recognizes landscapes formed from traditional patterns of human land use and degraded landscapes capable of being restored (Landals et al., 1988). To be workable, this arrangement requires the co-operation of all levels of government in the development of research programs and management plans for such internationally significant sites.

World Heritage Sites (UNESCO)

A program designed to ensure the identification, protection, preservation, and interpretation of the world's most significant cultural and natural heritage resources (Landals et al., 1988). It requires a co-operative arrangement at all levels of government to research and designate a site, and an international commitment by both levels of government to preserve its heritage features.

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PERSONAL COMMUNICATIONS

- Hackborn, Jean. Member of Woolwich Township LACAC, Elmira, Ontario.
- Legatte, Sharon. Member of Paris LACAC, Paris, Ontario.
- Springs, Valerie. LACAC Co-ordinator, Heritage Cambridge, Cambridge, Ontario.
- Thorning, Steve. Member of Elora LACAC, Elora, Ontario.

TABLE 1
Outstanding Human Heritage Features
Associated with the River

Significant Areas	Outstanding Features or Associations
Lower Grand	<ul style="list-style-type: none"> - high concentration of archaeological sites - Dollier-Galinée Expedition, 1669 - Feeder Canal - Grand River Navigation Company
Six Nations	<ul style="list-style-type: none"> - major Loyalist settlement group, 1784 - Chiefswood
Brantford	<ul style="list-style-type: none"> - high concentration of archaeological sites - area of Historic Neutral settlement - Mohawk Chapel - Brant's Ford - Bell Homestead - Canal system
Paris	<ul style="list-style-type: none"> - cobblestone buildings - Penman knitting mills
Cambridge	<ul style="list-style-type: none"> - variety of limestone and grey granite buildings - variety of early settlement groups: <ul style="list-style-type: none"> Pennsylvania-Germans, Scots, Germans - variety of industrial heritage structures: flour and textile mills, foundries, furniture factories
Kitchener-Waterloo	<ul style="list-style-type: none"> - Centre of Pennsylvania-German and European German settlement - Pioneer Memorial Tower - Homer Watson - West Montrose Covered Bridge
Nith Valley	<ul style="list-style-type: none"> - high concentration of archaeological sites - Amish settlement, 1820s
Elora/Fergus	<ul style="list-style-type: none"> - concentration of waterpowered grist mills - limestone buildings - early Scottish influence in Fergus - Shand Dam (Belwood)
Guelph	<ul style="list-style-type: none"> - Canada Company headquarters, 1827 - concentration of buildings of architectural sign. - Goldie, Allan & Phoenix mills - Col. John McCrae birthplace
Eramosa	<ul style="list-style-type: none"> - concentration of water-powered mills
St. Jacobs	<ul style="list-style-type: none"> - early Mennonite settlement - E.W.B. Snider flour mill

TABLE 2

Major Human Heritage Agencies and Management Arrangements*

Federal:

<i>Environment Canada</i>	Historic Sites and Monuments Act National Parks Act National Battlefields Commission Canadian Heritage Rivers System Co-operative Heritage Arcas Federal Advisory and Co-ordinating Committee on Heritage Conservation Environmental Assessment and Review Process Canadian Inventory of Historic Buildings Restoration Services Division
<i>Indian and Northern Affairs Canada</i>	Indian Act
<i>Transport Canada</i>	Railway Act
<i>Department of Finance</i>	Income Tax Act
<i>Communications Canada</i>	National Gallery of Canada Canadian Museum of Civilization National Museum of Natural Science National Museum of Science and Technology

Provincial:

<i>Ontario Ministry of Culture and Communications</i>	Ontario Heritage Act Ontario Heritage Foundation Heritage Conservation Easements Designated Property Grant Local Architectural Conservation Advisory Committees
<i>Ontario Ministry of Municipal Affairs and Housing</i>	Planning Act Municipal Act Ontario Building Code

* Many of these arrangements also relate to recreation.

<i>Ontario Ministry of the Environment</i>	Environmental Assessment Act Environmental Protection Act
<i>Ontario Ministry of Tourism and Recreation</i>	Historic Parks Act
<i>Ontario Ministry of Natural Resources</i>	Conservation Authorities Act Lakes and Rivers Improvement Act
<i>Ontario Ministry of Consumer and Commercial Relations</i>	Cemeteries Act

Formal Interest Groups:

Archindont (Architectural Index of Ontario)
 Architectural Conservancy of Ontario
 Archives of Ontario
 Association for Preservation Technology
 Association of Heritage Consultants
 Canadian Centre for Architecture
 Canadian Conservation Institute
 Canadian Oral History Association
 Heritage Canada Foundation
 Local ethnic-cultural organizations
 Local historical societies
 Multicultural History Society of Ontario
 Ontario Archaeological Society
 Ontario Association of Architects
 Ontario Historical Society
 Ontario Museums Association
 Ontario Society for Industrial Archaeology
 Society for Industrial Archaeology
 Society for the Study of Architecture in Canada
 Southwestern Ontario Archivist Association

LEGISLATION FEDERAL:	AGENCY / ORGANIZATION	PROGRAMMES AND INITIATIVES	SITE DESIGNATIONS	PURPOSES, GOALS AND OBJECTIVES	TENURE	MANAGEMENT PROCEDURES:
Historic Sites and Monuments Act:	Ministry of the Environment: Canadian Parks Service	<ul style="list-style-type: none"> ◆ Property acquisition ◆ Cost sharing contracts ◆ Designation and plaquing of historic sites and structures. 	<ul style="list-style-type: none"> ◆ National Historic Parks ◆ National Historic Sites 	<ul style="list-style-type: none"> ◆ The commemoration of historic sites ◆ The provision for administration, preservation and maintenance of historic places or museums 	<ul style="list-style-type: none"> ◆ Acquisition on behalf of the Crown; Treasury Board approval needed for purchase, lease, or other acquisition. 	<ul style="list-style-type: none"> ◆ Minister may mark or commemorate historic places ◆ Historic Sites and Monuments Board may recommend that the Minister; <ul style="list-style-type: none"> a) ignore the structure b) designate the structure and erect a plaque c) enter into a cost-sharing agreement d) acquire the property Note: the Minister is not bound by the recommendations of the Board. ◆ Board may receive relevant comments from public and other government agencies
National Parks Act:	Ministry of the Environment: Canadian Parks Service	<ul style="list-style-type: none"> ◆ Property acquisition ◆ Designation and plaquing of historic sites, structures, and persons. 	<ul style="list-style-type: none"> ◆ National Historic Parks 	A parks system approach to protecting historic sites	Acquisition on behalf of the Crown. Minister may purchase, expropriate or otherwise acquire any lands or interests for the purposes of a park.	<ul style="list-style-type: none"> ◆ Public recommendations may be made to nominate a nationally significant heritage site. ◆ The Historic Sites and Monuments Board receives the proposal and recommends to the Minister of the Environment which proposals should be approved ◆ Minister of the Environment may use a plaque to designate an historic site or person as well as other means such as property purchase.

MONITORING AND FEEDBACK	POLICY CO-ORDINATION	STRENGTHS	WEAKNESSES	POSSIBLE ROLE IN MANAGING GRAND RIVER HUMAN HERITAGE
<p>An annual report is to be submitted by the Board to the Minister.</p>	<p>Historic Sites and Monuments Board is composed of:</p> <ul style="list-style-type: none"> ◆ Dominion Archivist ◆ Officer of the National Museums of Canada ◆ Officer of Environment Canada ◆ Provincial representatives 	<ul style="list-style-type: none"> ◆ Enables Federal government to purchase properties ◆ Can be applied to almost any property in Canada ◆ Minister is empowered to purchase land under the National Parks Act to form National Historic Parks 	<p>Constitutionally, all matters pertaining primarily to "property and civil rights" are of exclusive provincial jurisdiction; therefore, the federal government can name national historic sites but cannot protect them; as such, designations have no legal effect.</p>	<p>Can serve a promotional and educational role by compiling a national register of human heritage sites and initiating educational programmes in schools.</p>
<p>Administration, management and control of the park under the direction of the Minister of the Environment. Management plan for the park outlines administration and regulatory controls.</p>	<p>Review of site proposals by the Historic Sites and Monuments Board.</p>	<ul style="list-style-type: none"> ◆ Provides a significant human heritage area with a management plan ◆ Now includes a cost-sharing approach to offset the high costs of monitoring these sites 	<ul style="list-style-type: none"> ◆ Limiting; designed to preserve only the country's most significant sites ◆ Concept of creating enclaves is an effective way at preserving nature, but its application to historic buildings and structures presents problems: <ol style="list-style-type: none"> 1) presents history in a static way 2) tends to isolate buildings from the living communities around them 3) there tends to be a limit to the range of sites protected. i.e. most national historic parks and sites focus on forts, fur trade establishments and buildings associated with historic figures; vernacular life is largely ignored (Dalbard, 1986) 	<p>Limited; Provincial involvement in human heritage generally makes it difficult to establish federally owned and operated national parks. Human heritage sites or structures must also have national significance. Important role may be played in promotion of human heritage resources.</p>

LEGISLATION PROVINCIAL:	AGENCY / ORGANIZATION	PROGRAMMES AND INITIATIVES	SITE DESIGNATIONS	PURPOSES, GOALS AND OBJECTIVES	TENURE	MANAGEMENT PROCEDURES:
Ontario Heritage Act:	Ontario Ministry of Culture and Communications	<ul style="list-style-type: none"> ◆ Provides for the formation of local architectural conservation advisory committees (LACACs) which i) assist municipal councils in determining the heritage value of candidate structures or areas, ii) survey local heritage resources, iii) provide reliable technical advice by involving the public, iv) promote heritage conservation within communities, v) advise property owners on conservation practices, and vi) produce descriptive pamphlets and exhibits. 	<ul style="list-style-type: none"> ◆ Individual structures or properties ◆ Heritage Conservation Districts ◆ Provincial designation of archaeological sites 	<ul style="list-style-type: none"> ◆ Enables municipalities to designate properties of historic or architectural value or interest. Also provides for the conservation of archaeological resources. Designations can be for individual structures or for groups of structures. ◆ Delegates demolition and alteration controls that were previously the subject of individual municipal acts to all municipalities under a more coherent administrative system. 	Private and public	<ul style="list-style-type: none"> ◆ Designation Process: <ol style="list-style-type: none"> 1) Candidate area is selected following an architectural survey, planning study, or proposal. 2) Information on the property's historic or architectural value is gathered (normally done by the LACAC) 3) Owner is informed; a statement is drawn up outlining the reasons for the designation. 4) Council should be presented with a report outlining the values of the property. 5) If council accepts a LACAC recommendation, owner must be informed and a "notice of intention to designate" must be published in a local newspaper. 6) Objections to the designation must be filed within 30 days of the appearance of the notice. 7) If there is no objection, council may enact a by-law designating the property. Copies are registered at the proper land registry office. 8) If there is an objection, council delegates the matter to the provincial Conservation Review Board. A public hearing is held. Council may act on the Board's advice and go ahead or withdraw the designation.
Ontario Planning Act	Ontario Ministry of Municipal Affairs and Housing	<ul style="list-style-type: none"> ◆ Official Plans <p>Enables local government to formally set down its goals, objectives and policies on how it wants to develop in the future and to set a framework for the preparation of implementing control mechanisms and review of land development proposals</p> ◆ Zoning by-laws <p>Designed to protect neighbourhoods from the intrusion of undesirable uses. Zoning by-laws are the main tool of implementing municipal policy plans and establishing pre-set regulations governing the use of land.</p> 	<ul style="list-style-type: none"> ◆ Environmentally Sensitive Areas ◆ Landuse Zoning ◆ Design By-laws 	Provides for the protection of features of significant natural, architectural, historical or archaeological interest.	Land may be acquired and held by a municipality for the purpose of developing any feature of the Official Plan	Zoning By-law: <ol style="list-style-type: none"> 1) Preparation of proposed zoning by-law 2) Notification 3) Public Meeting 4) Council adoption of by-law 5) Notification of decision 6) appeal ⇒ O.M.B. Hearing 7) no appeal ⇒ By-law effective

MONITORING AND FEEDBACK	POLICY CO-ORDINATION	STRENGTHS	WEAKNESSES	POSSIBLE ROLE IN MANAGING GRAND RIVER HUMAN HERITAGE
<ul style="list-style-type: none"> ◆ Municipal council is authorized by the Act to restore illegally altered properties and recover the costs from the owner. ◆ For heritage districts, compatibility and design of new construction may be reviewed and regulated by council in a manner more rigorous than permitted under the Planning Act. ◆ Requires workers in the field of archaeological research to be licenced by the province. 	<p>Close cooperation exists between the municipal LACAC and individual property owners. The Ontario Heritage Foundation makes certain funding arrangements available for owners or organizations to restore or rehabilitate designated structures. The Conservation Review Board (CRB) handles designation disputes and other matters and advises municipal councils.</p>	<ul style="list-style-type: none"> ◆ Allows for the designation of any real property which includes buildings, street furniture, landscape elements, bridges, engineering works, and industrial structures. ◆ Gives a property a measure of protection from demolition or unsympathetic alteration. ◆ Property becomes eligible for financial assistance from various local and provincial programmes that support heritage conservation. ◆ Enables the protection of districts while permitting compatible new developments to proceed. ◆ Does not restrict or prohibit alterations, renovations, or additions to heritage properties. ◆ Does not restrict the sale of a property or affect its resale value. 	<ul style="list-style-type: none"> ◆ Does not prevent demolition of heritage properties. Council may refuse an application to demolish a heritage structure for 180 days to find another buyer for the property or to negotiate with the owner; after this period, the owner may be allowed to receive a demolition permit if he or she so wishes. ◆ Does not prohibit alterations to a property. Allows council 90 days to review an application to alter the property. 	<ul style="list-style-type: none"> ◆ Heritage Conservation Districts provide a method of preserving the human heritage of areas rather than individual structures, this is important if a nodes and corridors planning approach is adopted for the basin. ◆ Protection of archaeological resources in the Valley.
<ul style="list-style-type: none"> ◆ Notification of a zoning by-law is made; if no objections are raised, the by-law is put into effect ◆ A zoning by-law may be repealed by a decision of the Ontario Municipal Board. 	<p>Ontario Municipal Board, may approve, modify, or reject the planning decisions made by municipalities; handles planning decisions that are contentious</p>	<ul style="list-style-type: none"> ◆ Permits municipal governments to refuse a demolition permit on a dwelling in a zone indefinitely if the applicant refuses to guarantee the replacement of the structure by another one within the period of two years. ◆ Can protect a structure from being demolished for the establishment of parking lots or for speculative reasons (Denhez, 1978, 109). ◆ Requires Regional Municipalities to prepare overall plans and member municipalities to adapt their plans to conform to the regional plan. 	<ul style="list-style-type: none"> ◆ The Counties of Ontario are not required to develop overall plans. Constituent municipalities are not required to conform their plans to the county plan ◆ Zoning is often not flexible enough to regulate new development; can mislead the public into a false sense of assurance on future land use in a community. 	<ul style="list-style-type: none"> ◆ Design or sign by-laws in commercial districts to preserve the aesthetic appeal of the commercial area or an aspect of the area's heritage. ◆ Residential land use zoning to preserve the unique human heritage essence or character of an area. By-law should regulate alterations or renovations of existing buildings or homes.

LEGISLATION PROVINCIAL:	AGENCY / ORGANIZATION	PROGRAMMES AND INITIATIVES	SITE DESIGNATIONS	PURPOSES, GOALS AND OBJECTIVES	TENURE	MANAGEMENT PROCEDURES:
Environmental Assessment Act	Ontario Ministry of the Environment	Environmental Assesment	None	Various public authorities must submit a detailed assessment of the impact of proposed public works projects on the environment including cultural property. Large private projects may also come under this legislation (Denhez, 1978).	Assessment required on public land holdings and some large private land holdings.	<ul style="list-style-type: none"> ● Environmental assessment is required to demonstrate the environmental advantages and disadvantages of proceeding with the undertaking as proposed, of proceeding in other ways with the undertaking, and of proceeding with alternatives to the proposed undertaking. ● Environmental Assessment reports are to be submitted to the Environment Ministry for hearings, where necessary, by an Independent Environmental Assessment Board.

MONITORING AND FEEDBACK	POLICY CO-ORDINATION	STRENGTHS	WEAKNESSES	POSSIBLE ROLE IN MANAGING GRAND RIVER HUMAN HERITAGE
<p>Hearings may be held by an Environmental Assessment Board.</p>	<p>Ministry of Culture and Recreation advises on man-made heritage conservation matters and reviews environmental assessments in that regard</p>	<ul style="list-style-type: none"> ● Environmental assessments must be submitted on public and some private projects. 	<ul style="list-style-type: none"> ● Concern is focused too much on the protection of archaeological resources ● An assessment is not required if a building is termed as being 'retired' rather than 'demolished'. ● The definition of 'environment' within the Act may be too broad as it now stands; i.e. it is difficult to determine a project's social-economic impact on cultural resources. It has been recommended that the Act should be restricted to assessing only the natural environment (Ontario Ministry of Housing, 1977). ● The use of holding by-laws may have close to the same desired results with respect to natural environments as an Environmental Impact Assessment. 	<p>Control over nature of construction or renovation in historically or culturally significant areas of communities. Takes into account effects on the human heritage "landscape".</p>

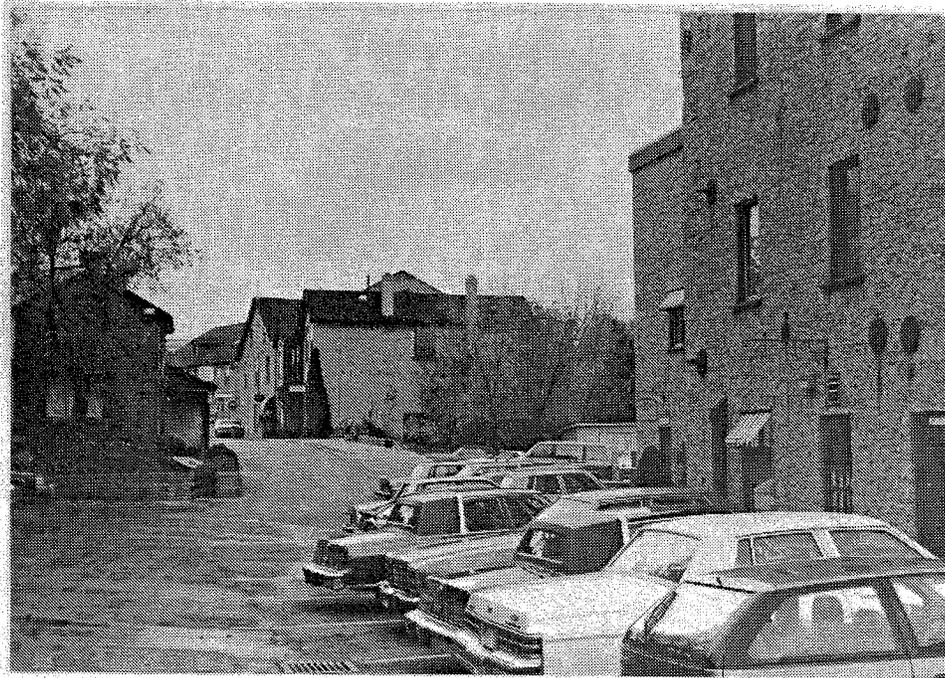


Figure 1. The Elora Mill Restaurant and Inn on Mill Street.

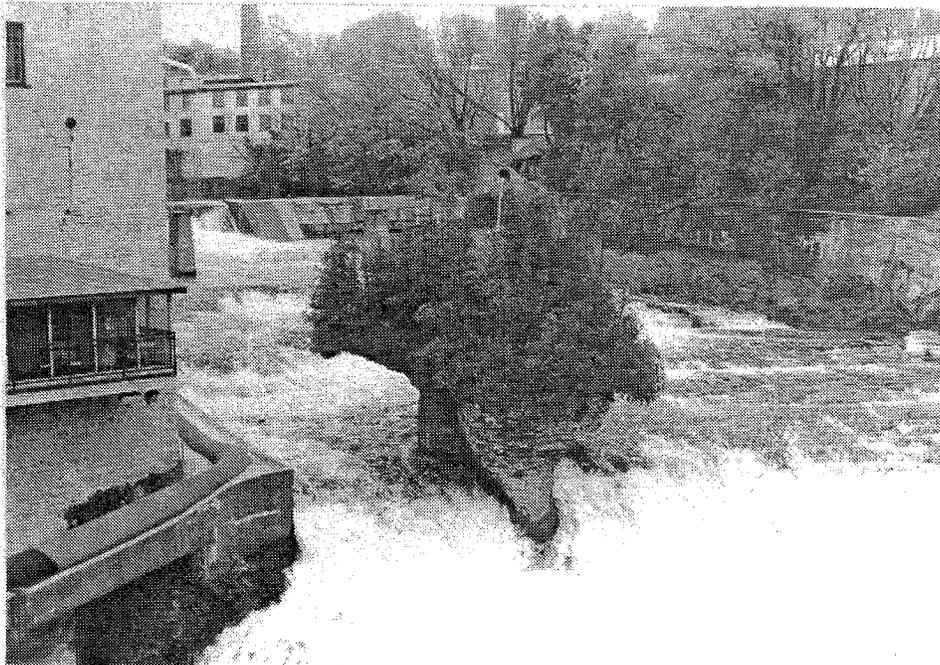


Figure 2. The Tooth of Time on the Grand River, Elora.

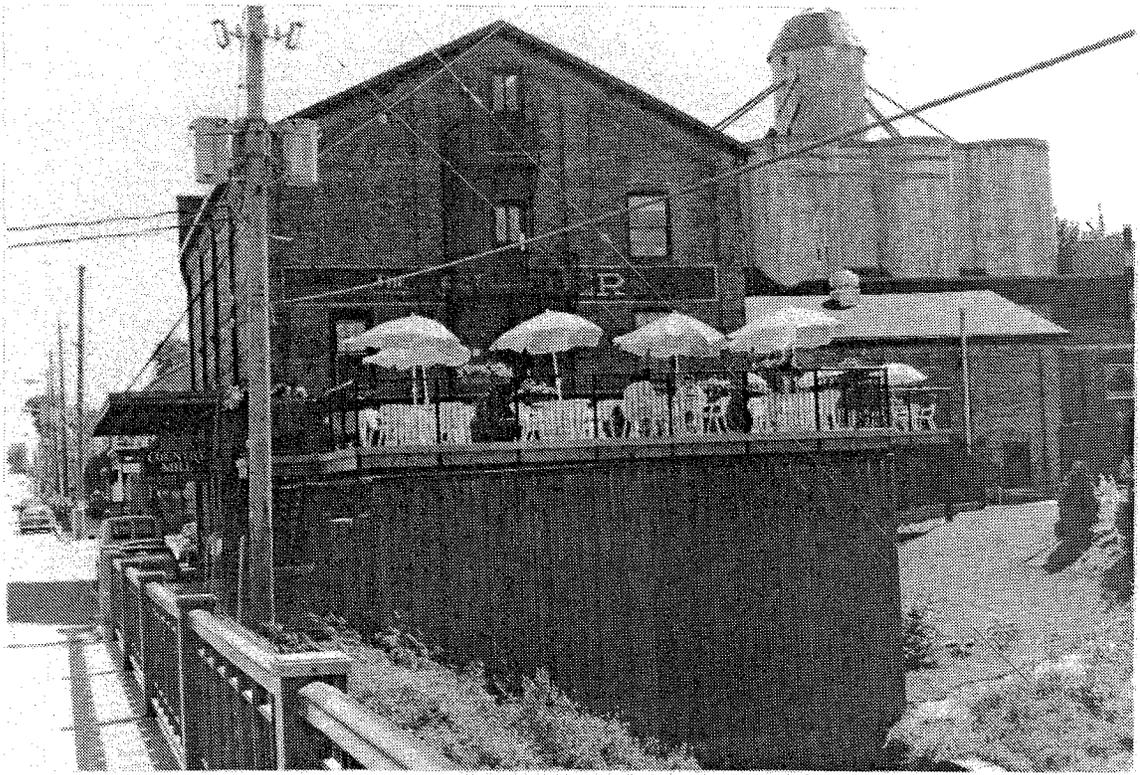


Figure 3. The old Snider Mill, now a restaurant and gift shop, in St. Jacobs .

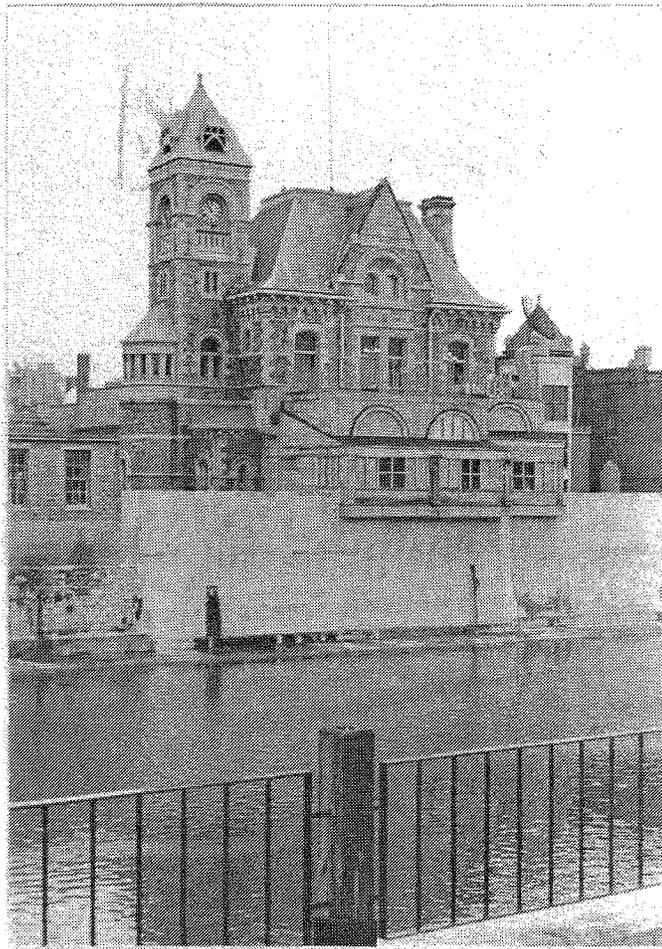
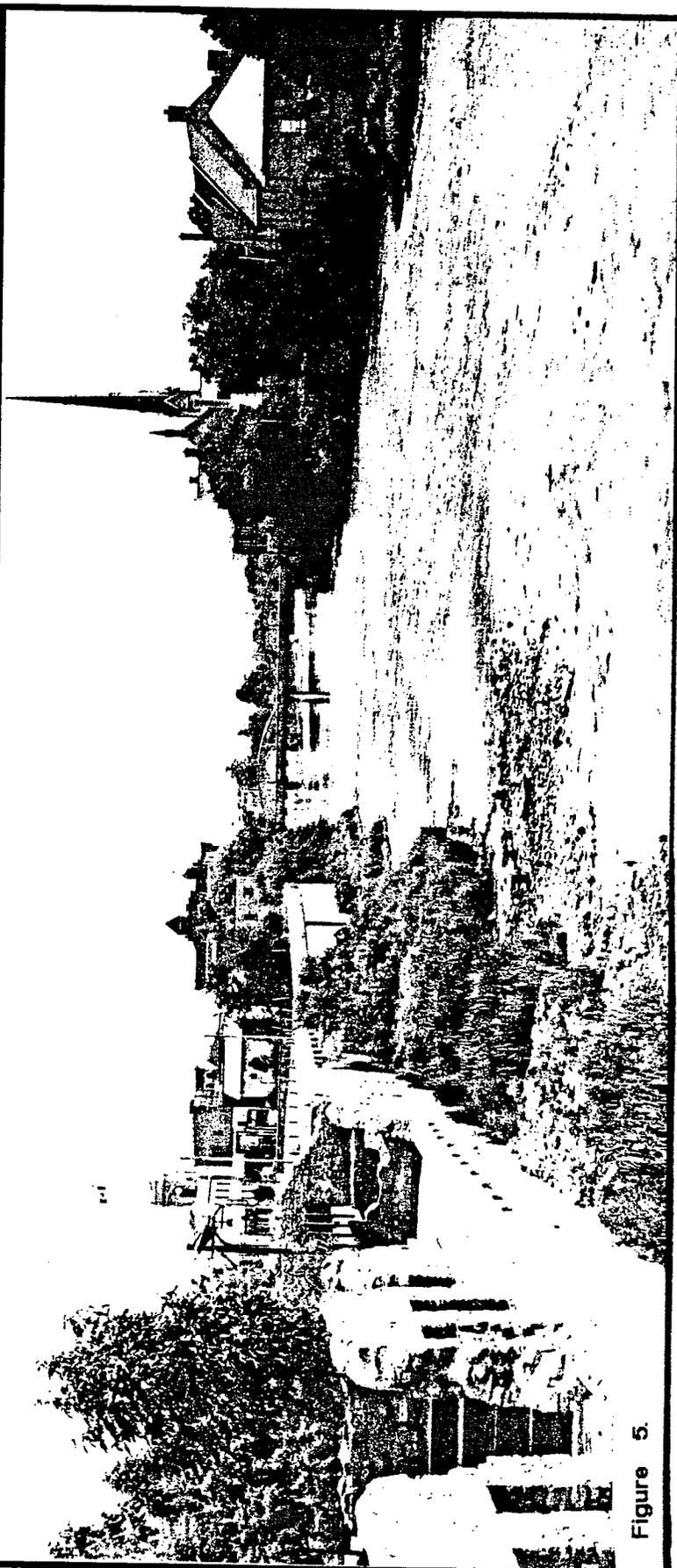
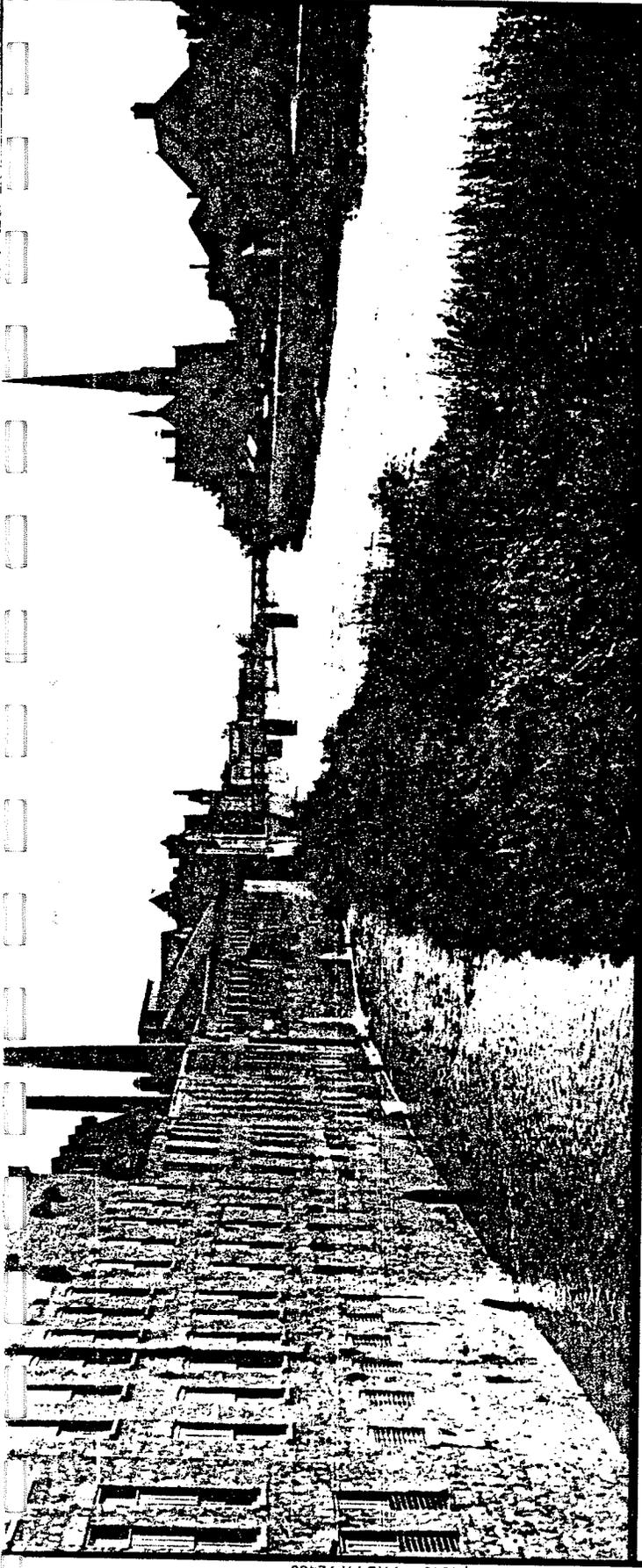


Figure 4. The former Galt post office as seen from across the Grand River.



JULY 17, 1983 / J. BOYD DEC 9, 1915 PAC PA-72456

Figure 5.

Woollen Mills along the Grand River in Cambridge (Galt) 1915 (top) and 1983. From: Martin, V., (1988). Changing Landscapes of Southern Ontario.



Figure 6. A riverside park in Cambridge (Galt)

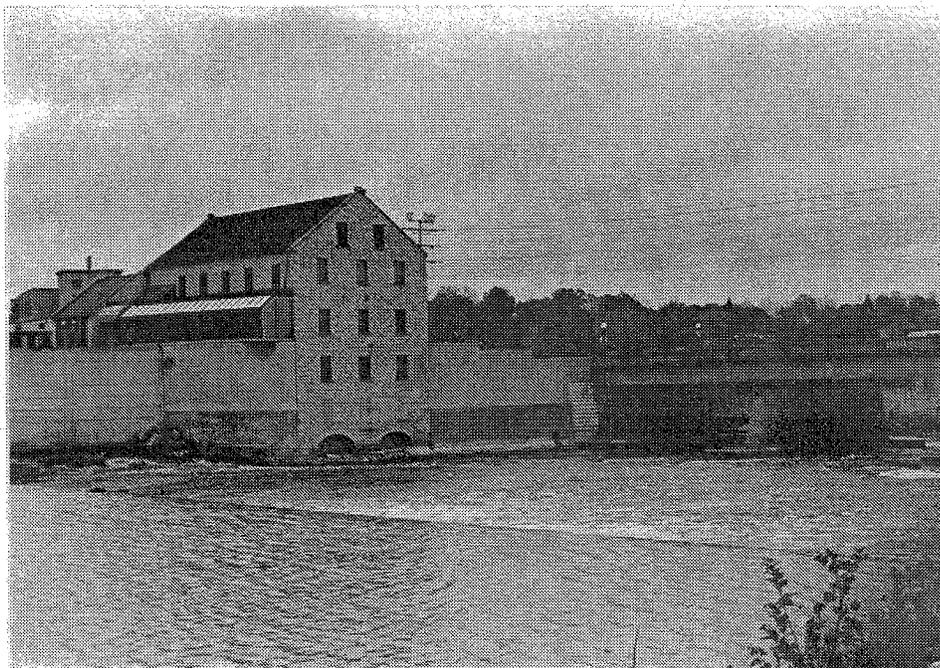


Figure 7. The Dickson Mill, now the Mill Restaurant, seen from across the Grand River in Galt.

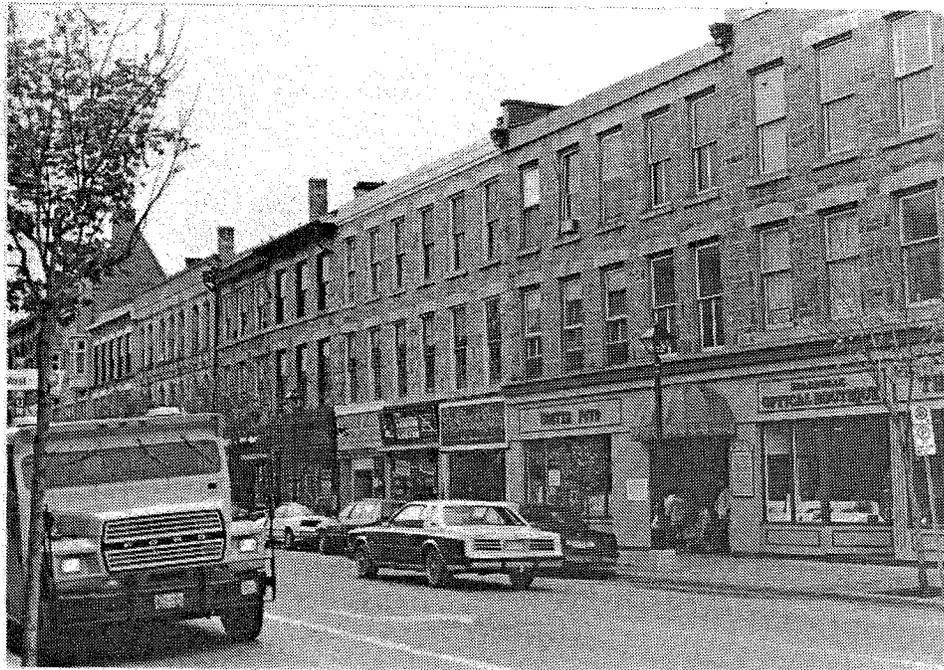


Figure 8. Main Street, Cambridge (Galt); a Heritage District under the Ontario Heritage Act.



Figure 9. A typical plaster home along Grand River Street in Paris.



Figure 10. Retirement home in Lower Town, Paris.

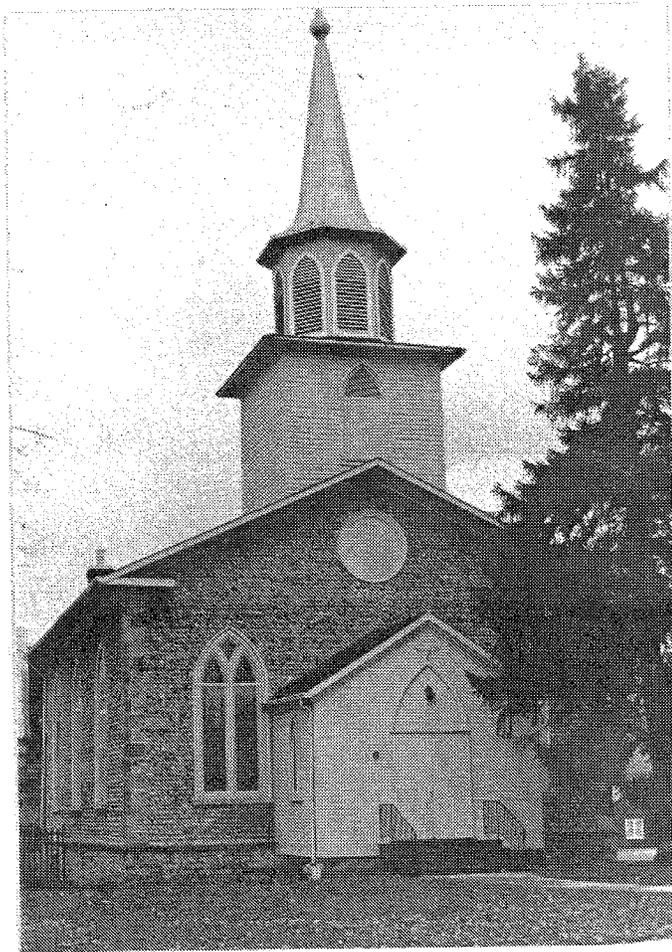


Figure 11. St. James Anglican Church, Upper Town, Paris.

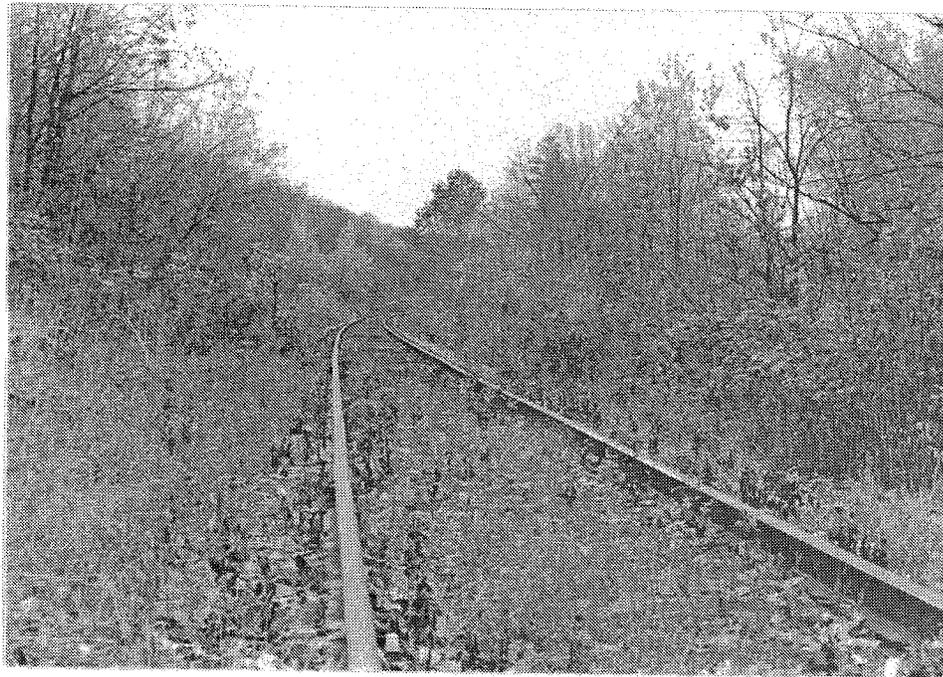


Figure 12. The abandoned Paris to Galt railway line.

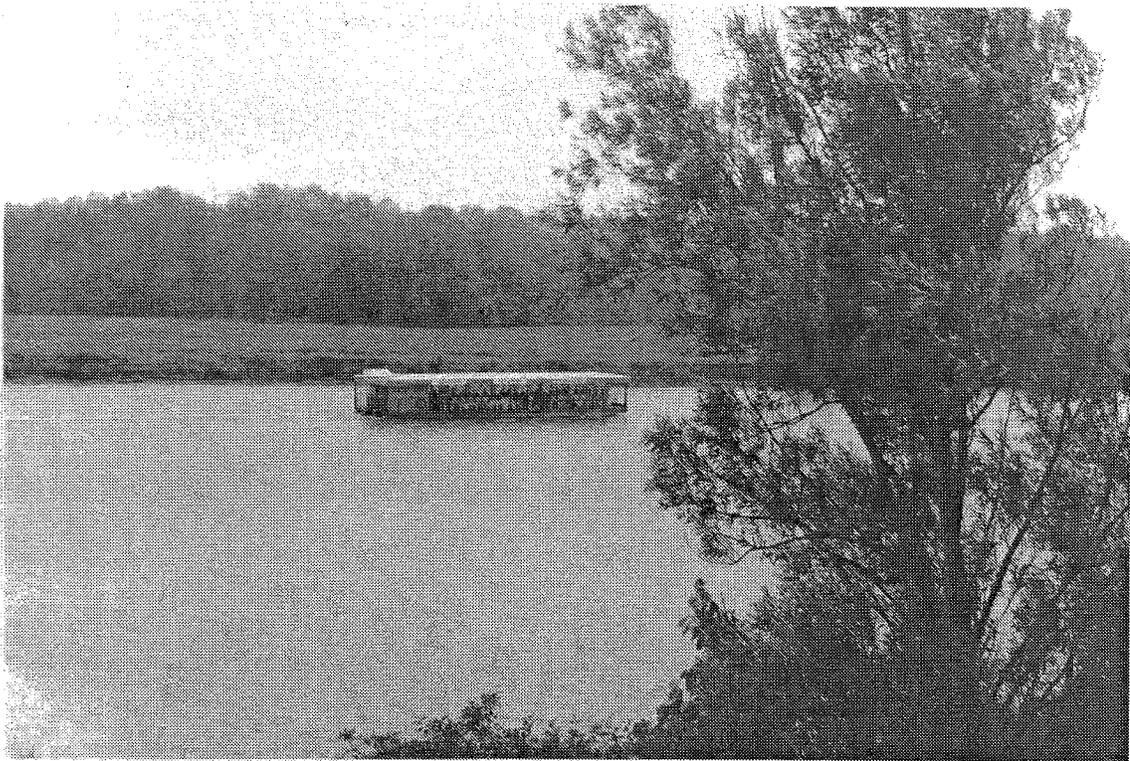


Figure 13. The Grand River Princess: Modern boating traffic on the lower Grand River.

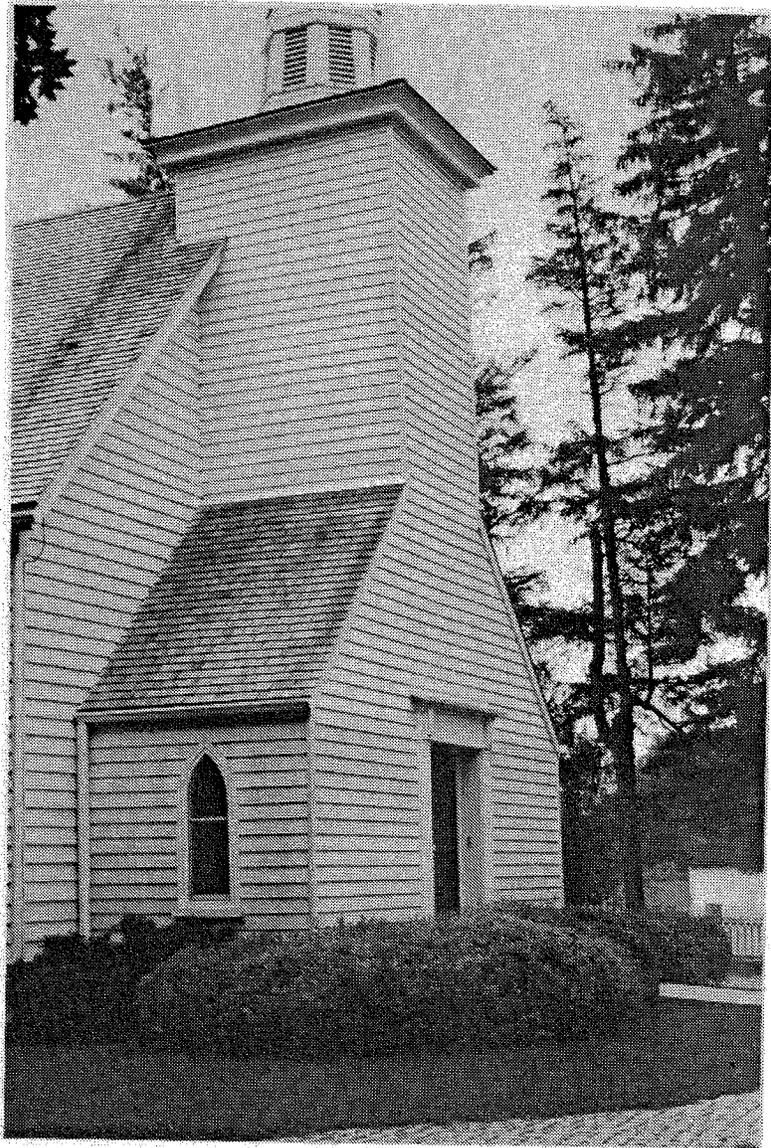
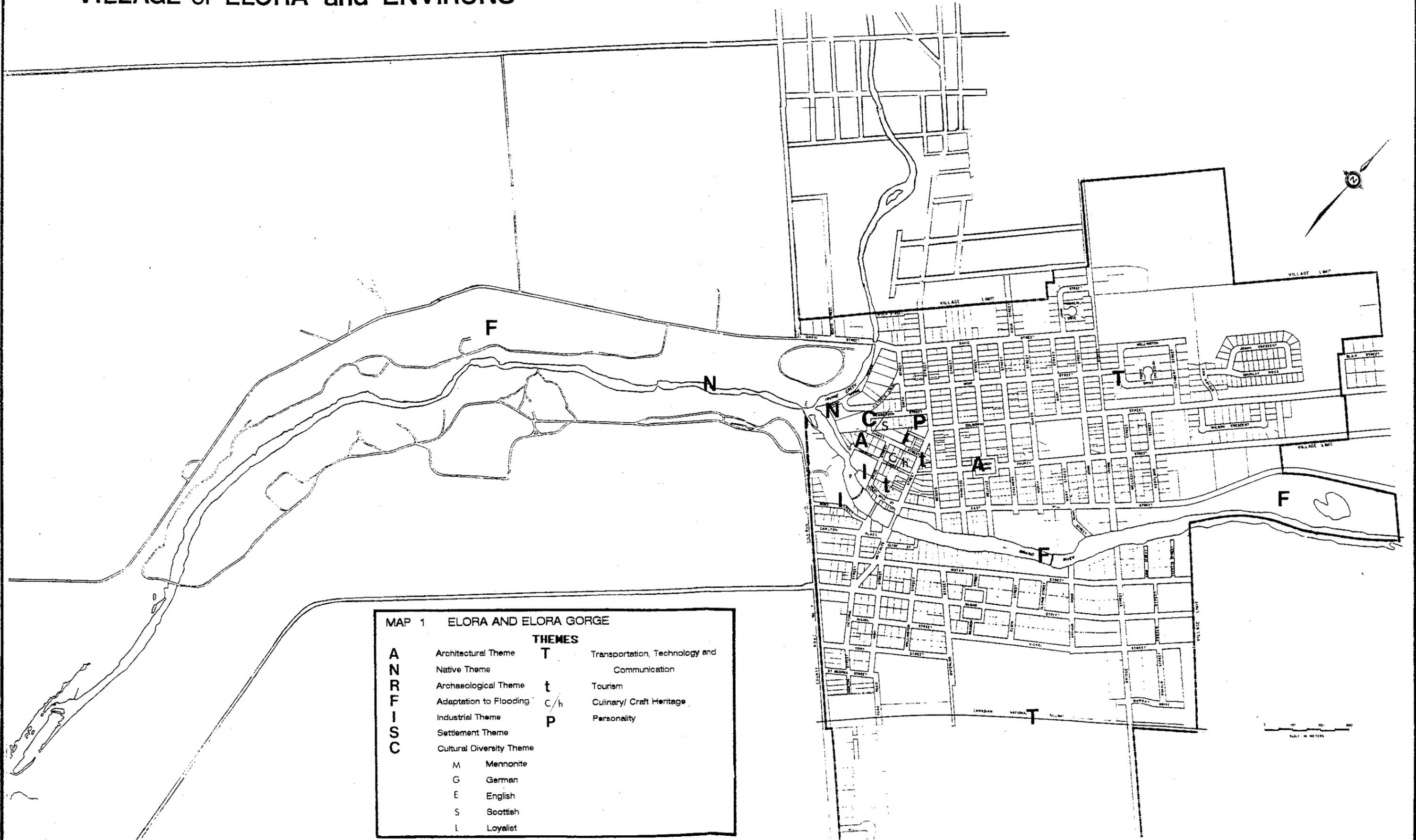


Figure 14. Mohawk Chapel, Brantford.

VILLAGE of ELORA and ENVIRONS



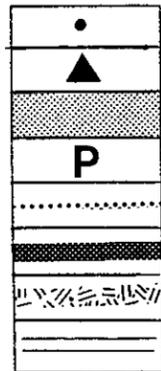
MAP 1 ELORA AND ELORA GORGE

A N R F I S C	Architectural Theme	T	Transportation, Technology and Communication
	Native Theme		
	Archaeological Theme	t	Tourism
	Adaptation to Flooding	C/h	Culinary/ Craft Heritage
	Industrial Theme	P	Personality
	Settlement Theme		
	Cultural Diversity Theme		
	M Mennonite		
	G German		
	E English		
S Scottish			
L Loyalist			

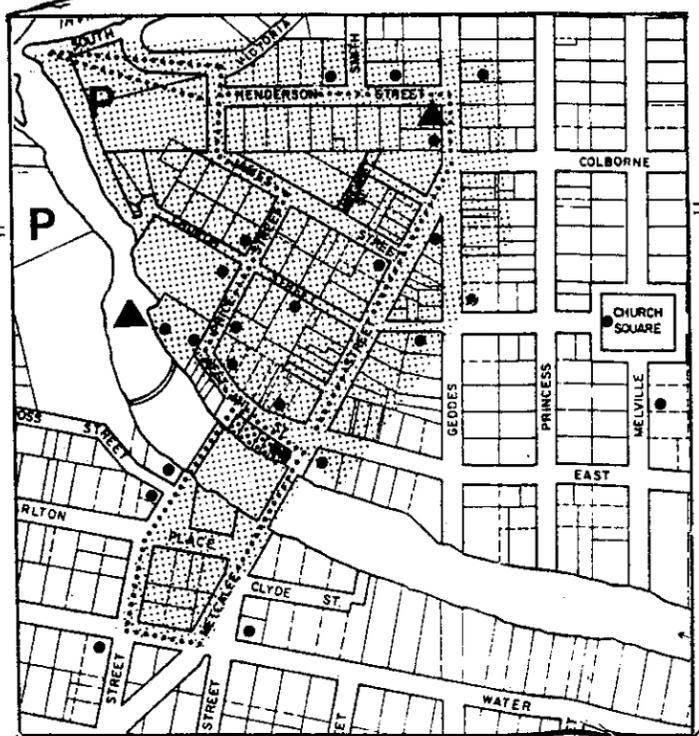
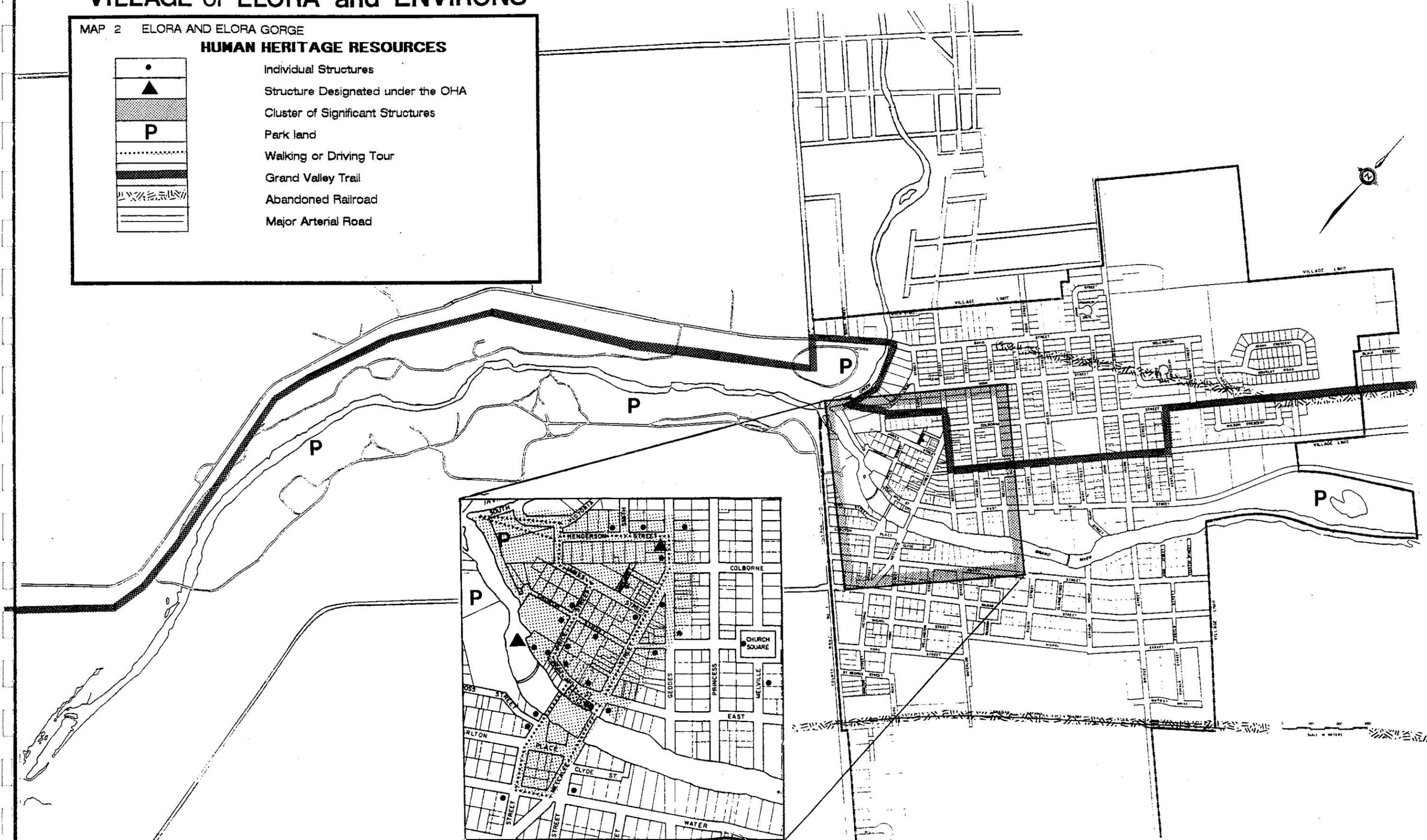
VILLAGE of ELORA and ENVIRONS

MAP 2 ELORA AND ELORA GORGE

HUMAN HERITAGE RESOURCES

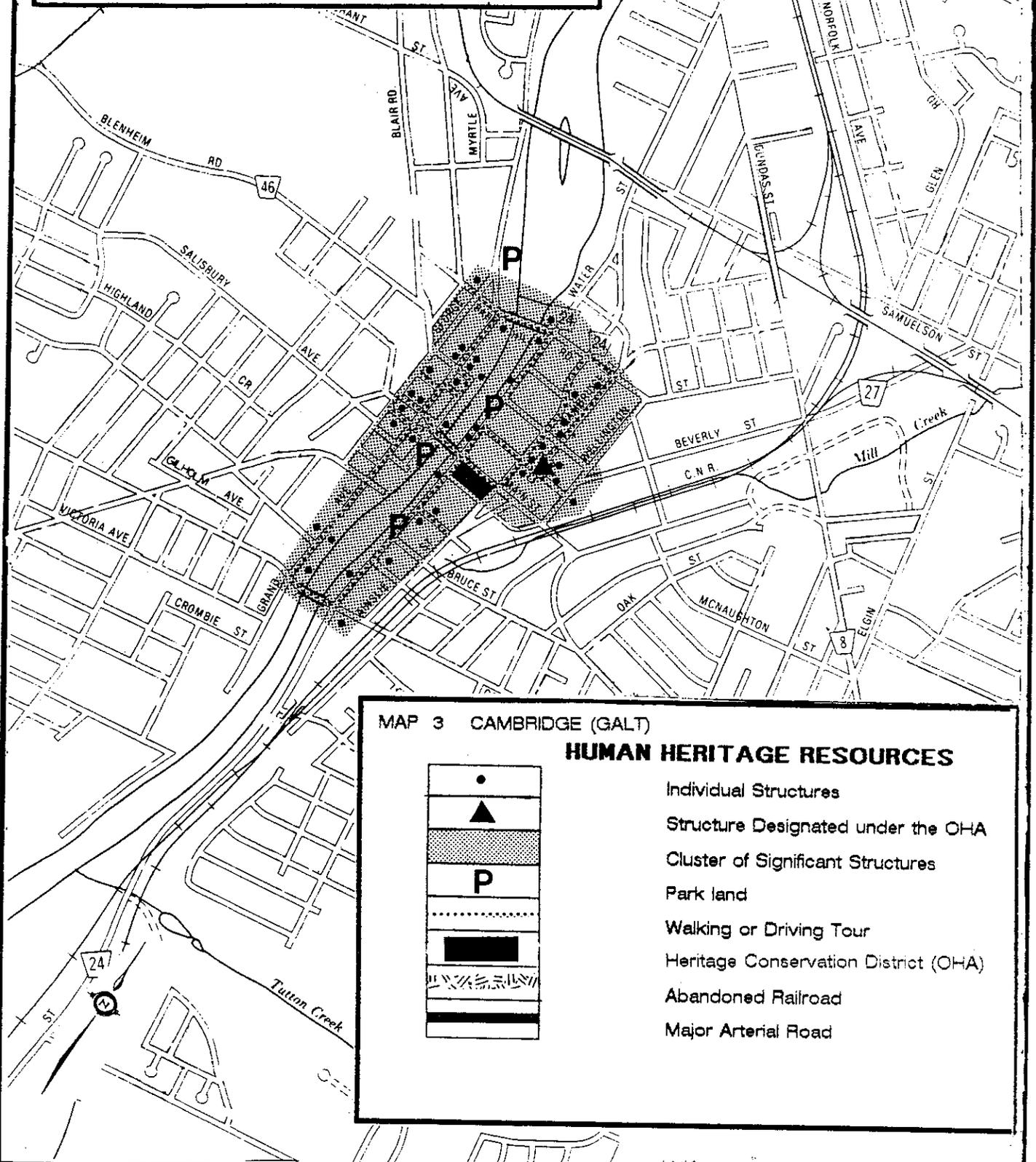


- Individual Structures
- Structure Designated under the OHA
- Cluster of Significant Structures
- Park land
- Walking or Driving Tour
- Grand Valley Trail
- Abandoned Railroad
- Major Arterial Road



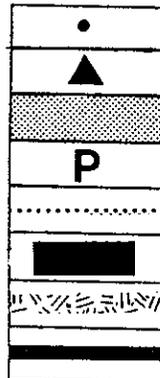
CITY OF CAMBRIDGE (GALT)

HUMAN HERITAGE



MAP 3 CAMBRIDGE (GALT)

HUMAN HERITAGE RESOURCES



Individual Structures

Structure Designated under the OHA

Cluster of Significant Structures

Park land

Walking or Driving Tour

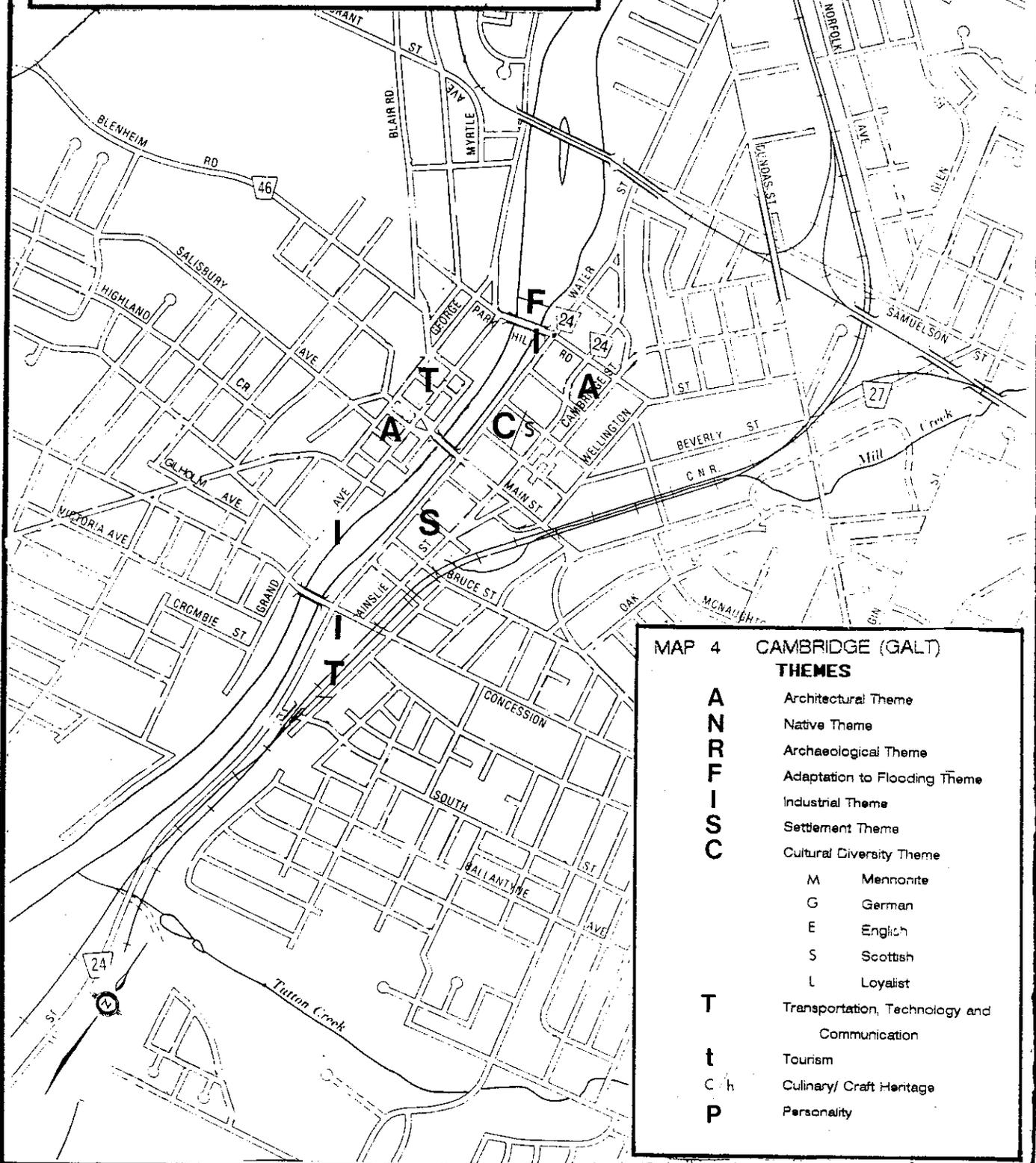
Heritage Conservation District (OHA)

Abandoned Railroad

Major Arterial Road

CITY OF CAMBRIDGE (GALT)

HUMAN HERITAGE



MAP 4 CAMBRIDGE (GALT)
THEMES

**A
N
R
F
I
S
C**

- Architectural Theme
- Native Theme
- Archaeological Theme
- Adaptation to Flooding Theme
- Industrial Theme
- Settlement Theme
- Cultural Diversity Theme

- M Mennonite
- G German
- E English
- S Scottish
- L Loyalist

T

Transportation, Technology and
Communication

t

Tourism

C h

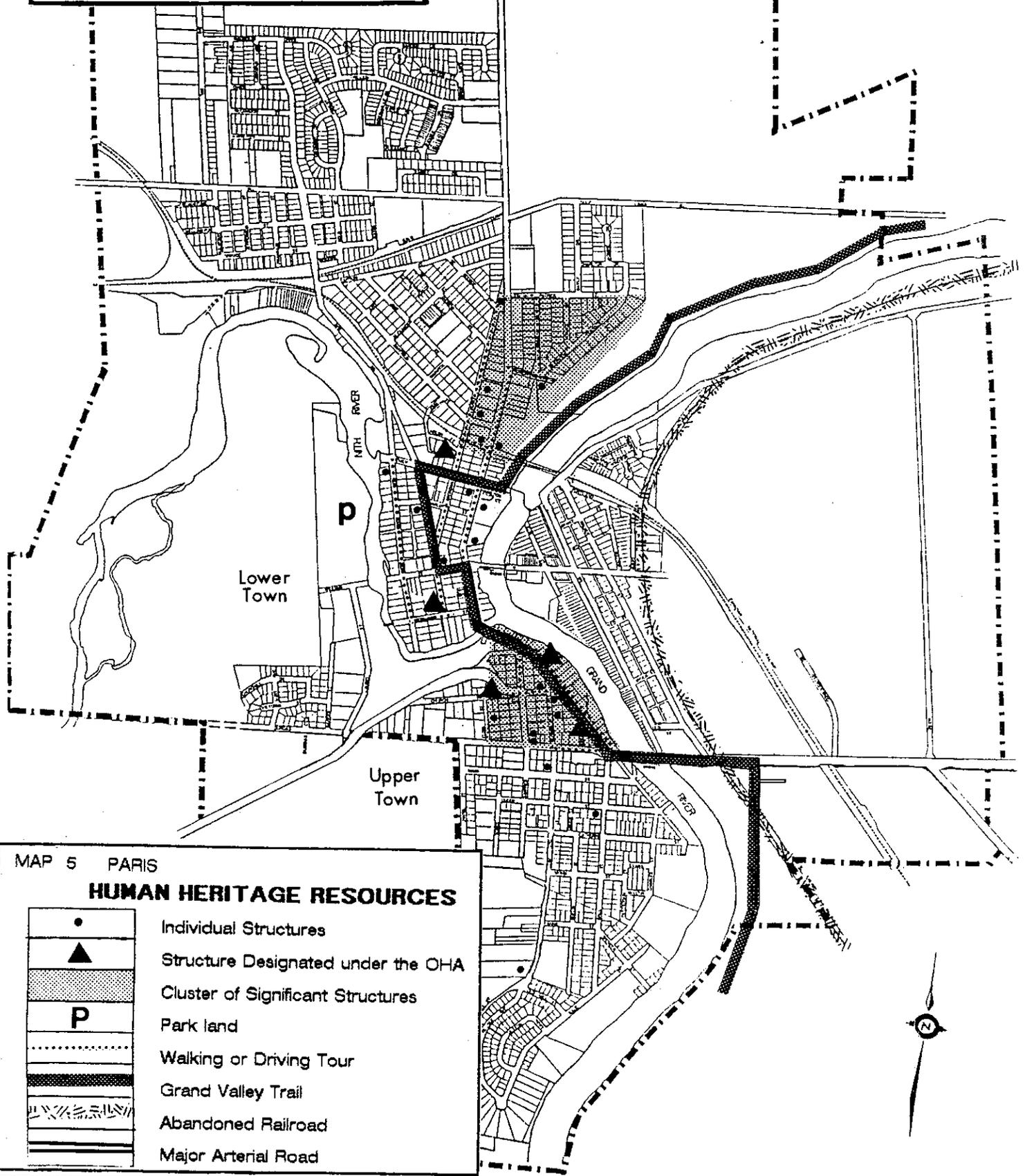
Culinary/ Craft Heritage

P

Personality

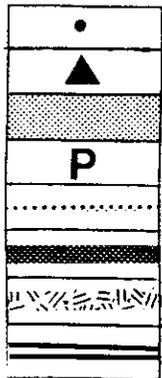
TOWN OF PARIS

HUMAN HERITAGE



MAP 5 PARIS

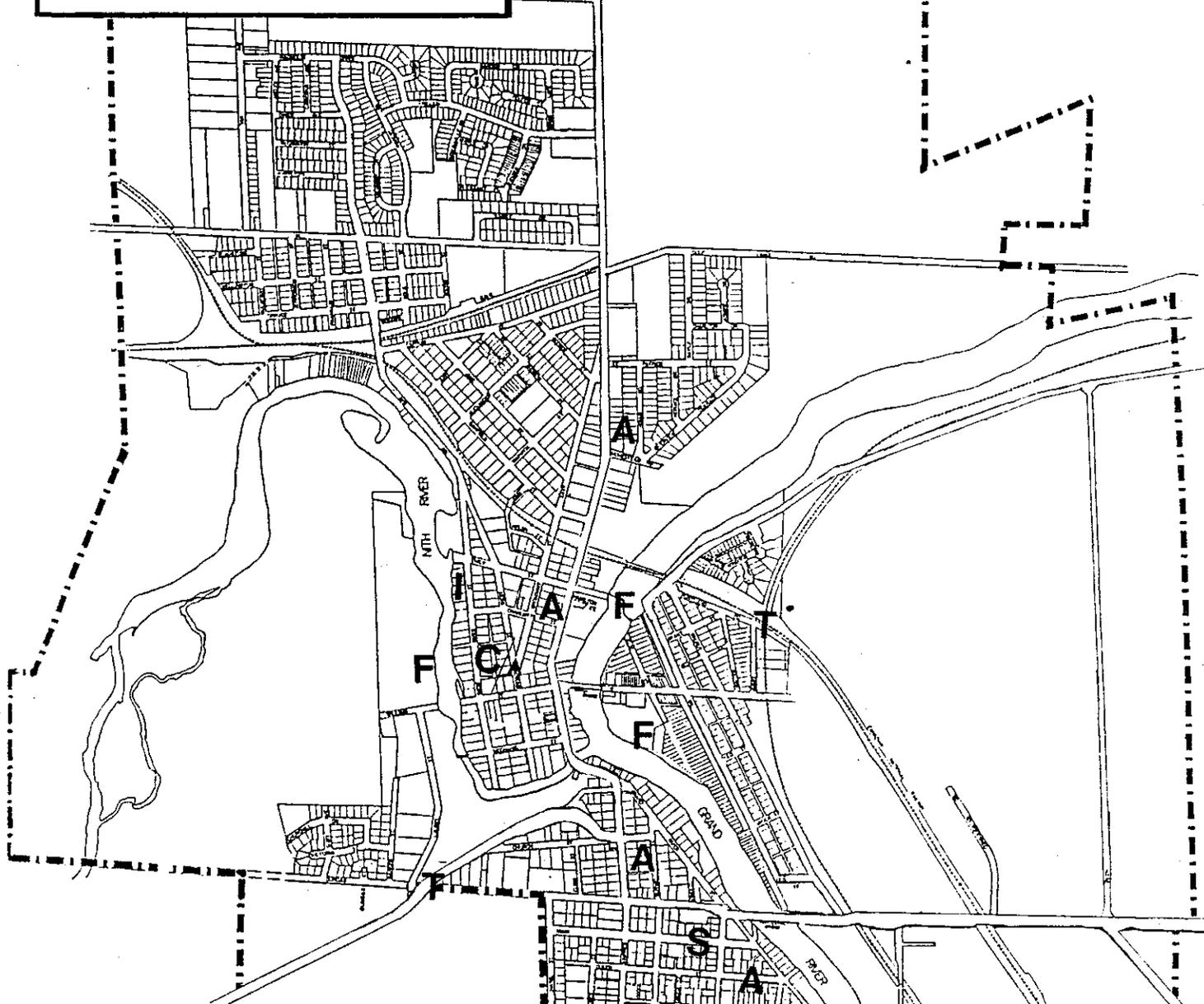
HUMAN HERITAGE RESOURCES



- Individual Structures
- Structure Designated under the OHA
- Cluster of Significant Structures
- Park land
- Walking or Driving Tour
- Grand Valley Trail
- Abandoned Railroad
- Major Arterial Road

TOWN OF PARIS

HUMAN HERITAGE



MAP 6 PARIS

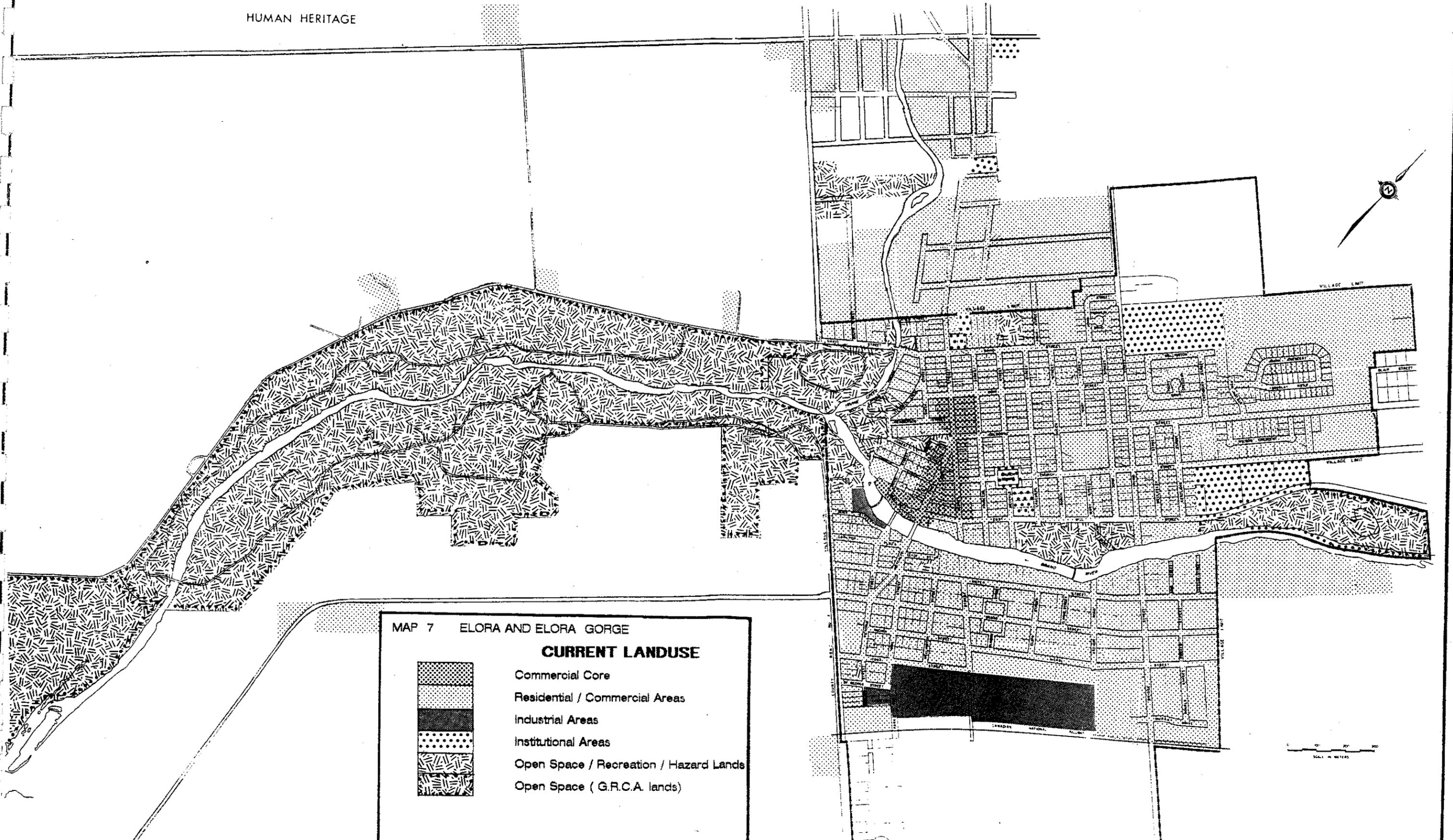
THEMES

A
N
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- | | | | |
|--------------------------|-----------|--|------------|
| Architectural Theme | A | Transportation, Technology and Communication | T |
| Native Theme | | Tourism | t |
| Archaeological Theme | | Culinary/ Craft Heritage | C/h |
| Adaptation to Flooding | | Personality | P |
| Industrial Theme | | | |
| Settlement Theme | | | |
| Cultural Diversity Theme | | | |
| M | Mennonite | | |
| G | German | | |
| E | English | | |
| S | Scottish | | |
| L | Loyalist | | |

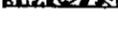
VILLAGE of ELORA and ENVIRONS

HUMAN HERITAGE



MAP 7 ELORA AND ELORA GORGE

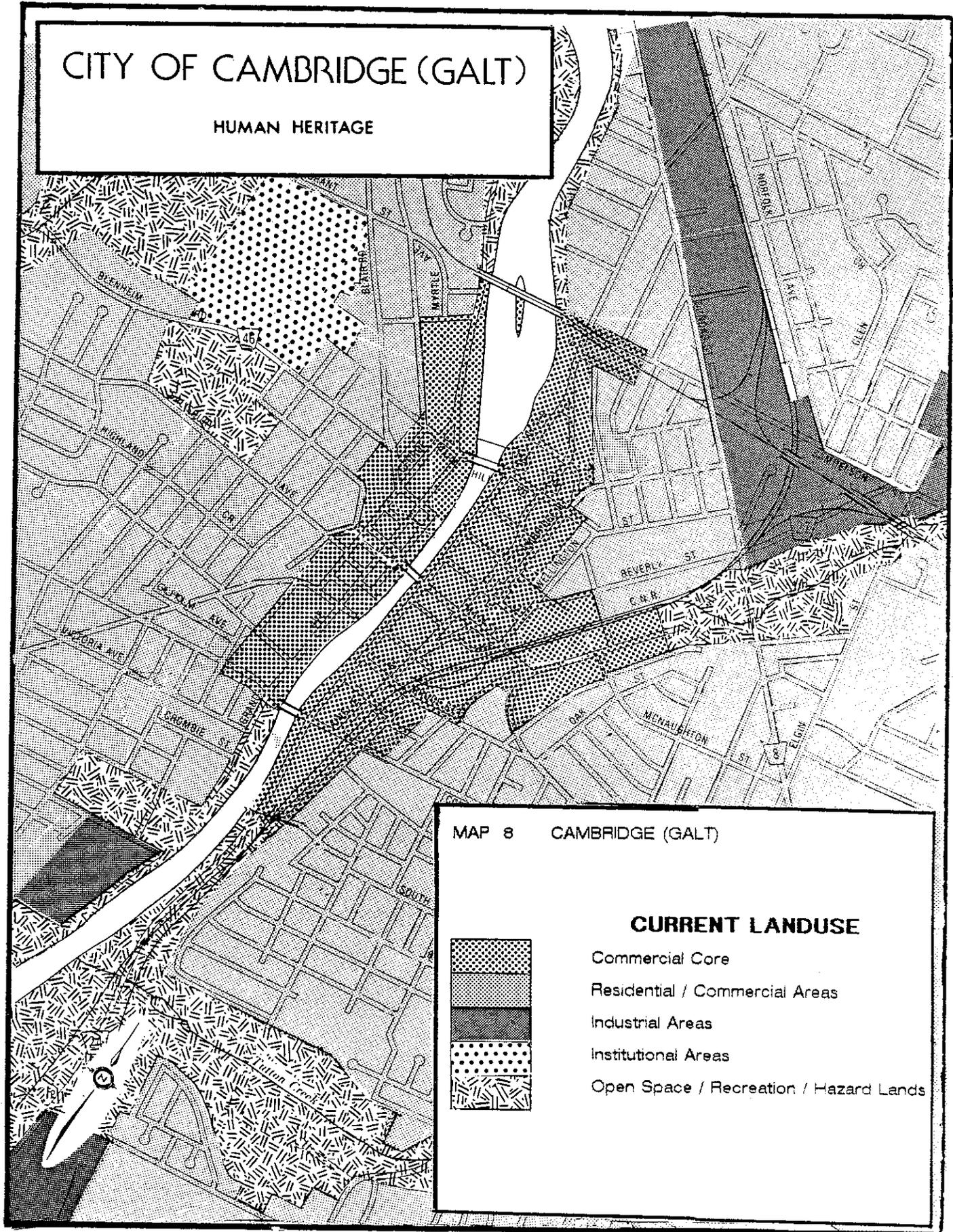
CURRENT LANDUSE

	Commercial Core
	Residential / Commercial Areas
	Industrial Areas
	Institutional Areas
	Open Space / Recreation / Hazard Lands
	Open Space (G.R.C.A. lands)

SCALE IN METERS

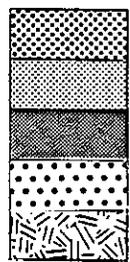
CITY OF CAMBRIDGE (GALT)

HUMAN HERITAGE



MAP 8 CAMBRIDGE (GALT)

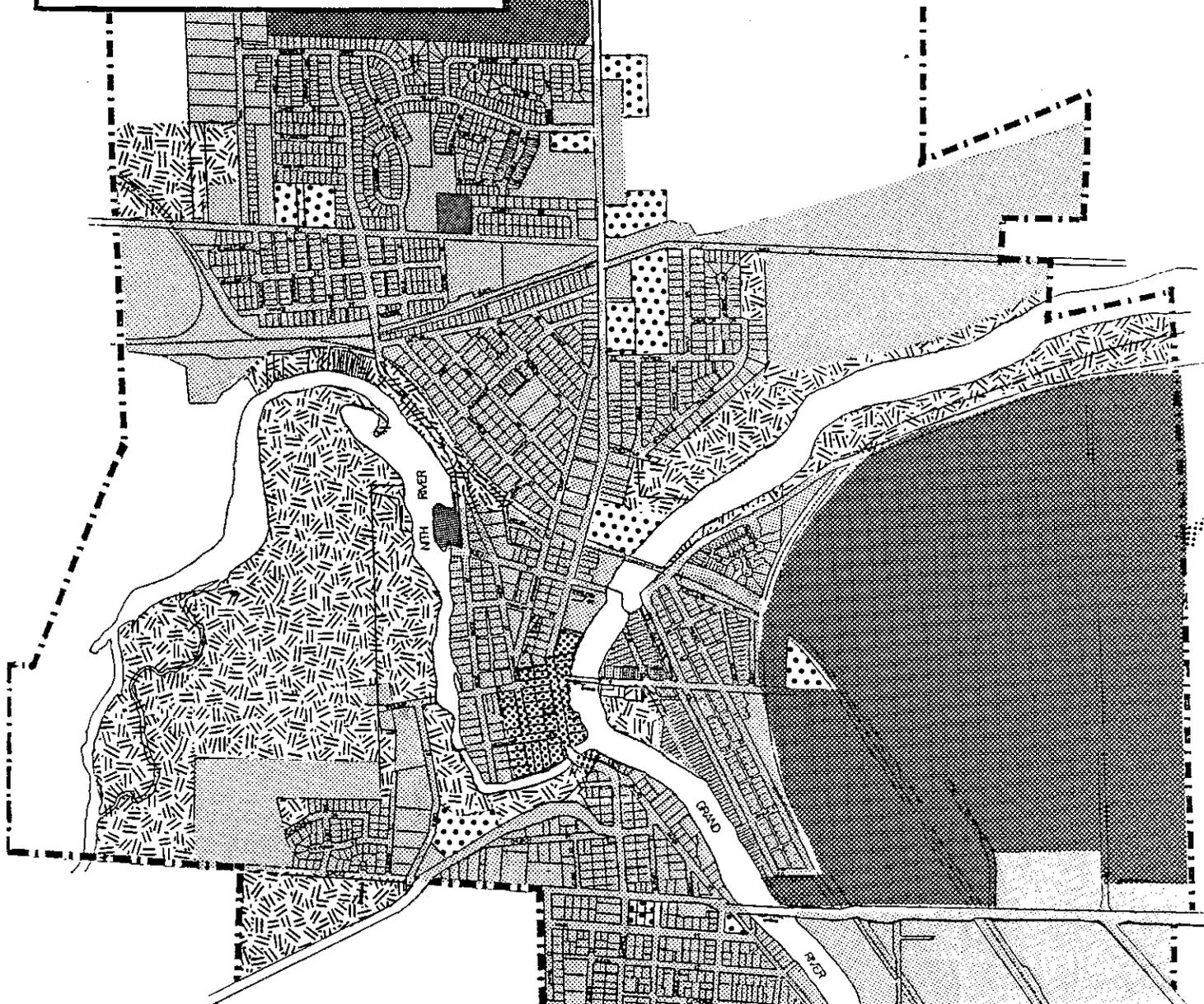
CURRENT LANDUSE



- Commercial Core
- Residential / Commercial Areas
- Industrial Areas
- Institutional Areas
- Open Space / Recreation / Hazard Lands

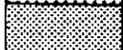
TOWN OF PARIS

HUMAN HERITAGE



MAP 9 PARIS

CURRENT LANDUSE

-  Commercial Core
-  Residential / Commercial Areas
-  Industrial Areas
-  Institutional Areas
-  Open Space / Recreation / Hazard Lands

Human Adaptation to the Riverine Environment With Special Reference to the Grand River Conservation Authority

Andrew J. Skibicki and J.G. Nelson

CONTEXT

Human adaptation to riverine environments takes many forms, from dams, weirs, and impoundments, through levees and flood control structures, to land use zoning, environmental impact assessment and other measures. The effects of these adaptations often include changes that enhance the natural and human heritage of many areas. Careful study of these changes can point up directions and implications which are of strategic value for planners and concerned citizens. Such studies can also result in findings whose significance may not have been recognized by planners or citizens and which may lead to recommendations for changes in policy or practice in the future.

Since the days of early European settlement, the Grand River has been a highly regulated and controlled natural resource. Early mill and other industrial operations were based upon the river's water power potential, resulting in the construction of many small dams and weirs to create holding ponds to serve these activities. Strategies for human adaptation to the river were sectorally or community based and related to economic development of the riverine environment (Boyd et al., 1973).

The 19th century deforestation of upper valley lands for timber and agriculture, coupled with the growing human presence on floodplain lands in such towns as Elora, Bridgeport, Galt, Paris, and Brantford, led to the development of a severe flood hazard and low water quality problem in the Grand River valley. Human adaptation strategies subsequently centred on minimizing flood damages and controlling the health hazard posed by low water levels in the river. Again, these strategies initially were community or sectorally based with no basin-wide integration and co-ordination (Shrubsole, 1989).

Early use of dyking and floodwalls by valley communities did not prevent heavy property losses during the late 19th and early 20th centuries (Table 1). Individual community efforts to control industrial and sewage waste emissions to improve water quality in the Grand were also generally unsuccessful. Adaptation strategies began to evolve towards some form of co-ordinated, valley-wide water conservation approach (Shrubsole, 1989).

In 1905, W.H. Breithaupt proposed the construction of several upstream conservation dams to provide flood protection for communities farther downstream. Although his initial proposals generated little public, political or professional support, severe flooding events in 1912, 1913, and 1929 eventually culminated in the Finlayson Report (1932), which recommended the construction of several multi-purpose dams and reservoirs to provide for water supply, sewage dilution, flood control and power development. To carry out the construction of these first dams, the province created the Grand River Conservation Commission (GRCC) in 1932.

The progressive degradation of the province's natural resource base, and the threat this posed to continued economic growth, brought resource conservation into the forefront as a major issue in the early 1940s. The 1946 *Conservation Authorities Act* created the Grand Valley Conservation Authority and initiated the move to integrated, basin-wide water resource management. Amendments and changes to the original *Conservation Authorities Act* have broadened the human adaptation approach from flood hazard and low flow control to concerns such as reforestation, education, wildlife management, urban open space establishment, outdoor recreation, natural area protection, soil conservation, and heritage conservation.

Human use of the riverine environment is now heavily regulated by agencies such as the Ontario Ministry of Natural Resources (OMNR), the Grand River Conservation Authority (GRCA), the Ontario Ministry of Agriculture and Food (OMAF), local municipal governments and others. On the whole, the stated objective of the current GRCA adaptation strategy in the watershed is to develop programs which will further the conservation, restoration, development and management of natural resources other than gas, oil, coal and minerals (Ontario Ministry of Natural Resources, 1988).

Early Adaptation Strategies

Early use of floodplain lands along the Grand River by man dates back to the time of early native settlement. However, extensive building on these lands and the associated modifications to the natural hydrologic cycle of the river were begun by early European settlers. Small villages such as Doon, Bridgeport and Elora grew to service forestry and agricultural uses in the watershed. With this development on the floodplain and the resultant basin-wide landscape restructuring for human use, humans intruded on the complex natural processes of the river. They chose to be in constant conflict with the riverine environment in flood-prone areas to obtain the many benefits of the river.

The first major structures built on the floodplains were waterwheel mills. These mills utilized the enormous water power potential of the river for such purposes as cutting timber, milling flour, and processing fabrics. These early mills were almost always accompanied by dams, mill ponds, and residential and storage structures built on the river and on the floodplain. A total of 112 waterwheel mills operated on the Grand and its tributaries in Waterloo County alone, mostly in the area of Cambridge (Boyd et al., 1973).

As more and more wooded areas in the upper part of the watershed were replaced by row crops in the early 1800s and numerous swamps and wetlands were drained for agricultural uses, the flow regime of the river became extensively altered. River water flow was less evenly spread throughout the season. The level of water power could not sustain many mill operations. By the mid-1800s, many mills were closed due to the lack of a dependable water supply. Others were destroyed by the now hazardous spring floods and many formerly active floodplain areas were left to revert to natural conditions for many years (Boyd et al., 1973).

While the mill operations of the 1800s gradually closed down, the small towns and villages that evolved around them on the floodplain continued to function and grow. Communities such as Galt, Bridgeport and Doon continued to provide homes for people and space for new industries and businesses brought in to replace the mill factories. The river was now no longer regarded as an economic necessity but largely as a flood hazard, as many of these industries and businesses suffered thousands of dollars of damage in periodic floods. The river also increasingly became a health hazard as the low summer flows were unable to assimilate uncontrolled human and industrial waste dumpings. Major ecological damage was done to many

fish species, plant and wildlife communities in the river and on the floodplain (Grand River Conservation Authority, Water Management Series #2, no date).

Development of a Valley-Wide Water Conservation Strategy

Around the turn of the century, public concern over high and low river flow, flood damage potential to life and property along the Grand, and poor water quality, prompted a number of requests to the Government of Ontario to take action on the issues. In 1912, the municipalities of Brantford, Paris, Galt and Preston requested the Government of Ontario to provide flood relief measures for communities along the Grand River and to conduct a survey of the river to identify high and low water flows which might lead to flooding problems. In 1931, the newly formed Grand River Boards of Trade requested further investigations to be done on the high and low flow problem (Mitchell et al., 1978).

In response to these requests, the Ontario government passed the *Grand River Conservation Commission Act* (1932) which led to the creation of the Grand River Conservation Commission, a body represented by eight municipalities acting out of common interest in water conservation in the basin (Mitchell et al., 1978).

The Finlayson Report (1932) recommended that three storage reservoirs be constructed in the valley to control seasonally varied high and low water flows. Using this report as a basis the Commission, under the terms of the *Grand River Conservation Act*, constructed the Shand Dam in 1942, the Luther Dam in 1954, and the Conestogo Dam in 1958. Reforestation programs on reservoir fringe areas were undertaken by the Grand Valley Conservation Authority (Mitchell et al., 1978).

In April 1941, the Guelph Conference addressed degradation of Ontario's timber and wildlife resources by non-integrated management strategies. Its recommendations eventually led to the passing of the *Conservation Authorities Act* in 1946 and to the establishment of the Grand Valley Conservation Authority in 1948. The present Grand River Conservation Authority was established in 1966 through the amalgamation of the Grand River Conservation Commission and the Grand Valley Conservation Authority.

The *Conservation Authorities Act* initially made provincial government funding available to conservation authorities for flood control projects and authority forests. Since then, various amendments and changes to the original Act have broadened the involvement of the conservation authorities in resource management issues in river valleys. In 1952, government funding was expanded to permit conservation authorities to undertake smaller conservation projects such as tree plantings on private lands, community and farm ponds, land use demonstrations, small picnic areas, and the restoration of old mills. In 1954, the Act was amended to allow the development of recreation facilities on authority lands utilized for water management and conservation projects. In 1956, certain sections of the Act were changed to permit authorities to restrict and regulate the use of water from streams and other natural sources, and also to prohibit or regulate the dumping of fill of any kind in any area below the high water mark of any river, creek or stream. In 1970, the Act was changed to enable conservation authorities to regulate alterations to waterways. This expansion of responsibilities has effectively made conservation authorities the leading resource managers in Ontario's watersheds (Ontario Ministry of Natural Resources, 1988).

PATTERNS

The progress of various agencies in initiating an integrated water resource management strategy in the Grand River valley has resulted in the implementation of various physical adjustments and management arrangements that have changed the wild or free-flowing condition of the river and its tributaries. Programs to meet the needs of controlling the flood hazard and ensuring suitable water flow, increasing natural species populations, and providing recreation opportunities have manifested themselves in: (i) the establishment of control structures on the river; (ii) channel alterations; (iii) landfilling and landscaping programs; (iv) municipal and agency land use regulations; (v) information services; (vi) education programs; (vii) forestry operations; (viii) water quality monitoring and improvement programs; (ix) natural site inspections and inventories; and (x) wildlife stocking programs.

Control Structures

Map 1 shows the distribution of the 32 major dams and weirs that have been constructed or renovated in the valley since 1942 by the GRCA. Table 2 lists and describes these GRCA - operated structures. Numerous smaller and privately owned dams and weirs exist but have minimal effect on flood control (Mitchell et al., 1978: 52). A basin-wide river flow control strategy, the upstream dam/reservoir system, has evolved in the general belief that local adjustments to modify the flood hazard were impractical and ineffective.

Channel Alterations and Other Physical Adjustments

Map 2 shows the areas in the basin where retaining wall (artificial levee) constructions, major dyking operations, and major channel alterations (by dredging and stream bank erosion control) have occurred in the valley. The establishment of retaining wall systems has not always stemmed from the need to deal with the flood hazard. The retaining wall systems in Cambridge (Galt), for instance, date from 1850 and were built mainly to prevent erosion and to allow buildings to be constructed on valuable floodplain lands (Mitchell et al., 1978: 62).

Landfilling and Landscaping

Landfilling and landscaping activities are individual riverside adaptations that are regulated by the provincial Fill, Construction, and Alteration to Waterways Regulation which is administered by the Grand River Conservation Authority under the terms of the *Conservation Authorities Act*. The Ontario Ministry of Natural Resources also regulates private landscaping or filling operations with its: (i) *Public Lands Act*, which controls material deposition on public land or water bodies; (ii) *Beach Protection Act*, which controls material removed from water bodies; (iii) *Lakes and Rivers Improvement Act*, which controls physical adjustments that divert or hold back water; (iv) *Fisheries Act*, which controls activities which can harmfully alter, disrupt, or destroy fish habitats; and (v) *Beds of Navigable Waters Act*, which provides for the establishment of ownership of the bed of a navigable body of water (Ontario Ministry of Natural Resources, pamphlet *Dredging and Filling*, no date).

Zoning and Land Use Regulations

Efforts to regulate development on floodplains were initiated by the Grand Valley Conservation Authority in 1961, through the administration of a provincial regulation pursuant to the Conservation Authorities Act. Floodplain regulation was strengthened in 1970 with the introduction of a Fill, Construction and Alteration to Waterways Regulation which empowered the GRCA to prohibit construction in areas below the "high water mark" of any watercourse. This terminology was later clarified in 1974 to mean the area susceptible to flooding during a Regional Storm - a storm the magnitude of Hurricane Hazel (1954) centred over the Grand River watershed. The Fill, Construction and Alteration to Waterways Regulation has been periodically amended since 1974 with the addition of several schedules (Veale, pers. comm.).

Since 1970 the Authority has applied a one-zone concept to floodplain management in rural areas, which means that development within the floodplain is prohibited. Through a Fill, Construction and Alteration to Waterways permit process, minor encroachment on the floodplain may be permitted.

In urban areas, a two-zone approach has been applied. A two-zone approach recognizes a flood fringe and a floodway. The flood fringe represents an area which is susceptible to shallow, low-velocity flows during a Regional Storm. In this area, development may be permitted subject to stringent floodproofing requirements. The floodway represents an area which is susceptible to deep, high-velocity flows during a Regional Storm. Development in the floodway is prohibited (Figure 1).

In 1988, the Province of Ontario issued a Flood Plain Planning Policy Statement under Section 3 of the *Planning Act*. The one-zone and two-zone approaches are now required to be formalized in municipal planning documents as well as in Conservation Authority policies and procedures manuals (Ontario Ministry of Natural Resources and Ontario Ministry of Municipal Affairs, 1988).

In flood-prone communities where the application of one-zone or two-zone approach would undermine economic and social viability, a Special Policy Area approach may be a management option. This arrangement allows municipalities to apply to the GRCA and the province for special consideration. Once it has been established that a Special Policy Area is necessary for continued viability of the area, approval-in-principle may be granted to proceed with the designation process. A technical committee comprised of representatives from the municipality, GRCA, and the Ontario Ministries of Natural Resources and Municipal Affairs subsequently formulate appropriate policies based on technical and planning considerations. Prior to formal application of these policies, all government agencies involved in the process must approve the document (Veale, pers. comm.). Special Policy Area status has been approved for areas of Cambridge, Paris, Dunnville and Guelph. Draft approvals exist for Brantford, New Hamburg, Drayton, and Plattsville. Policies have been developed for the City of Waterloo and are awaiting final approval.

Information Services and Educational Programs

Several agencies are active in the basin in serving a consulting role for local municipalities, businesses, landowners and the general public. Pamphlets are frequently put out summarizing the policies, positions, or guidelines of agencies on various conservation issues. Displays, exhibits and audio/video presentations are frequently used to inform the general public on resource management in the valley. The GRCA has assumed a lead role in communicating conservation and resource issues to the public through its involvement in operating nature

centres, publishing literature, and organizing displays, speaking engagements and public meetings. The Authority is actively involved in providing hands-on educational programs to local school boards and sponsoring such events as a Resource Management Camp for high school students. Discussions regarding conservation and resource issues are facilitated by the Authority as a result of its unique relationship with its member municipalities, provincial government agencies and special interest groups (Vcale, pers. comm.).

Forestry Operations and Wetland Preservation

The G.R.C.A. maintains 1,665.2 hectares (4,113 acres) of reforestation property in the valley. These operations occur on numerous private lands as well as authority holdings. Generally, the GRCA plants trees on sites under 2 hectares while the OMNR deals with larger areas under the *Woodland Improvement Act*. Reforestation programs are primarily used as a watershed treatment strategy to modify the flood hazard and to control soil erosion; however, they also serve to enhance wildlife habitat in some areas and to provide recreation opportunities.

The GRCA and OMNR have also expanded their role as woodlot managers by undertaking programs, such as the Carolinian Canada Protection Program, to protect and enhance existing natural forest areas (GRCA, 1986). The tree nursery at the Burford Conservation Area has been producing Carolinian forest vegetation species for eventual replanting in the Carolinian forest zone (GRCA, 1984).

The GRCA has taken a lead role in protecting existing wetland environments through its Fill, Construction, and Alteration to Waterways Regulations. Wetland enhancement has occurred in some areas of the valley primarily from the construction of control structures on the Grand and its tributaries. Flooding of the original Luther Marsh in 1954 greatly increased the wetland habitat area for many migratory and other bird species (Ontario Ministry of Natural Resources, 1986). The presence of a weir at Dunnville has increased the wetland habitat for some species of birds upstream to Cayuga. However, dams and weirs have the potential to increase the amount of sediment accumulating in upstream reservoirs thus inhibiting the establishment of certain fish species (Kozlowski, 1984: 3; Welcomme, 1979: 247). Reservoirs or holding ponds are also susceptible to the slow process of eutrophication which results when a body of water is overly enriched with nutrients. Certain plant species are thus favoured over animal species. In an area such as Luther Marsh, this process tends to decrease the type of food available to certain bird species and has resulted in their gradual disappearance from the area (GRCA, 1983).

Water Quality Monitoring and Improvement

The GRCA maintains a water quality monitoring program at several automatic water quality stations in the watershed. The GRCA also maintains a swimming area water sampling program in conjunction with local health units (GRCA, 1987).

Natural Site Inspections and Inventories

The two agencies most involved in natural site inspection and surveying are the GRCA and the OMNR. With its large watershed mandate, the GRCA has had a strong involvement in surveys on fish species populations, wildlife habitat improvement studies, bird hunting data collection at Luther Marsh, and studies on the impacts of some development proposals on or close to natural areas (GRCA, 1987). The OMNR is extensively involved in collecting aquatic habitat information on all water courses, monitoring angler fish harvests, surveying deer populations,

rare and endangered species, heronries and critical biological areas, and managing crown land holdings (OMNR, pamphlet *We Can Help*, no date).

Wildlife Stocking Programs and Habitat Improvement

The majority of wildlife stocking programs are initiated by the OMNR in co-operation with many private groups and organizations. The OMNR is active in supplementing natural fish populations in areas that are extensively angled or where fish species are to be rehabilitated.

The GRCA is actively involved in stocking programs for its two controlled hunting areas at Luther Marsh and Conestogo Lake. Luther Marsh is annually stocked with black ducks and the Conestogo Lake hunting area is stocked with Korean ring-necked pheasants (GRCA, 1987).

SIGNIFICANCE

The preceding discussion has described the patterns of human interventions that have altered the free-flowing natural environment of the Grand River (Table 3). The most recent of these interventions have been by a few key agencies that have co-operated since the early 1940s in developing an integrated resource management strategy to serve the needs of the residents of the basin. While such adjustments are serving mainly to rehabilitate the river from decades of damage and neglect, in some instances they have also served to enhance the heritage aspects of certain areas. This section will identify significant areas in the Grand River basin where physical and institutional modifications to the riverine environment have served, at least in part, to enhance either human or natural heritage or recreation opportunities found in the area (Map 3). One area, the Grand River Forest, is very significant because it has remained relatively undisturbed by human activities.

The criteria used to select significant human-enhanced heritage areas have been developed from an inventory of the number of natural heritage enhancement programs, human heritage preservation activities, and recreation opportunities present in the area. An area may rank high in significance if one or more of the following apply:

1. enhancement of an existing natural feature has resulted from the presence of a water control structure or physical adjustment to the riverine environment;
2. enhancement or renovation of an existing human heritage building or structure has occurred as a result of the presence of a water control structure or a physical adjustment;
3. a significant number of previously unavailable recreation opportunities have been offered by the presence of a water control structure or physical adjustment;
4. the area is a Wildlife Management Area, wildlife sanctuary or resource management demonstration area;
5. the area contains a nature centre or other educational facility;
6. the area contains a tree nursery;
7. habitat rehabilitation programs have been implemented;
8. reforestation or wildlife restocking programs exist;

9. endangered species reintroduction programs exist;
10. the area is regularly surveyed and researched for wildlife populations or numbers;
11. the area has a large number of agencies working in close co-operation on resource management goals and objectives.

Final judgement on significance involves consideration of habitat or other losses due to weirs or other adaptations.

Significant Areas

Luther Marsh Conservation Area - Wildlife Management Area

The construction of a dam in 1954 has expanded the wetland environment for migratory bird species. Luther is a 5,666 hectare Wildlife Management Area co-operatively managed by the GRCA and the OMNR. A large portion of the management area is designated as a wildlife sanctuary for nesting colonies of herons, ospreys, and various ducks and geese. Various wildlife habitat improvement projects have been implemented in this area with the co-operation of hunting and naturalist organizations. The area is also reforested, providing habitat for deer, grouse and other animals. Luther area is also a GRCA controlled hunting area offering excellent opportunities for deer, small game and waterfowl. Boating activities are limited but the area offers excellent opportunities for hiking, picnicking and snowmobiling (GRCA, 1976).

Dunnville to Cayuga

The weir at Dunnville, which has existed since the early 1830s, has resulted in some enhancement of large wetland areas farther upstream for various bird species although sedimentation on the river's bottom may have been increased thus changing the habitat for various fish species. Byng Island Conservation Area offers boating, swimming, picnicking, fishing, hiking and camping opportunities. Nearby, the Taquanayah Nature Centre offers resource management and nature study experiences for local students.

Caledonia

The new weir, finished in 1980, has been equipped to serve as a future boat lock, thus possibly facilitating boating and other recreation based on the old historic theme of early canal navigation on the lower Grand River. Also, as part of its land acquisition program required for the construction of the weir, the GRCA, under agreement with the Town of Haldimand, took possession of the former Caledonia Milling Company building for rehabilitation and preservation as a local historical landmark (GRCA, 1980) (Figure 2). The weir also contains a fish ladder to permit fish species to migrate upriver. Recreation opportunities include swimming, boating, boat touring, picnicking and fishing.

Cambridge (Galt)

Recent land and property acquisition programs by the GRCA below the weir at Galt, as well as dyking and channel works, have led to the development of open space and parkland areas along the river that relate to the old industrial or mill theme (Figure 3). Properties like Mill Race Park and the Living Levee offer various recreation opportunities (Figure 4).

Conestogo Lake Conservation Area

Conestogo Lake offers a large variety of recreation opportunities. It is a GRCA controlled hunting area. The lake offers various water-based recreation activities. The area is reforested and a wetland enhancement and creation study has been undertaken by the GRCA in cooperation with a number of private organizations. The large populations of birds that frequently feed on the reservoir at times increase the coliform count in the lake through their droppings, thereby forcing swimming areas to be closed. These problems are infrequent, however, and occur mainly in the summer.

Guelph Lake Conservation Area

This area offers numerous water-based recreation opportunities such as swimming, boating, hiking, picnicking, and camping. The area is reforested and sections have been set aside for wetland creation and rehabilitation. Also, Guelph Lake has a centre which introduces local children to naturalist activities. An annual resource management camp for high school students brings in participants from throughout the valley. There have been some problems with low oxygen levels in the reservoir due to high coliform bacteria counts.

Belwood Lake Conservation Area

Belwood provides extensive swimming, boating, picnicking, hiking, and snowmobiling opportunities. The river below the dam is regularly stocked with trout and pike (Figure 5). An annual pike fishing derby is held in May. The area is reforested and a number of fish spawning surveys have been carried out (Figure 6).

Grand River Forest Area

Unlike the foregoing, the Grand River Forest area is very significant, indeed unique, in that no impoundments and relatively few other human interventions have occurred in this stretch of the river. For about 22 kilometres the river is free-flowing and devoid of dams or other cross-channel structures (Figure 7). This stretch of the river is lined with almost uninterrupted forest containing various Carolinian forest species and providing habitat for many birds and animals (Figure 8). As a wild and scenic reach of the river, this unique area also provides excellent canoeing and other recreation opportunities. The future integrity of this undisturbed area is being threatened by accelerated industrial and residential development within the townships of North and South Dumfries. This development has been changing the natural state of this area in ways not desired by many valley residents.

CONSTRAINTS AND STRESSES

There are areas in the valley where the strategies for human adaptation to the riverine environment have generated tension and conflicts among various users. The goals of the GRCA, for instance, to control flooding and to provide communities with adequate river flows for sewage treatment and ground water recharge, have put it into conflict at times with various municipal governments, private organizations and individual property owners. Map 4 shows conflict and stress areas in the Grand River valley that have arisen as a result of human adaptation to the riverine environment.

In 1976, a plan by the GRCA to build a fifth major flood control dam in the West Montrose valley was opposed by private landowners and some conservation groups. Although the dam was never built, the West Montrose area represents an ideal location for a reservoir in

the future and the GRCA continues to purchase property here (Thompson, 1988). The possibility of the dam being put in place in the future makes West Montrose a potential conflict area.

GRCA riverside land acquisition in Cambridge (Galt) in the 1970s led it into conflict with the Cambridge LACAC over historical building preservation. The conflict was the result of incompatible and inflexible mandates. The GRCA had plans to purchase and demolish two riverside buildings for a riverside park which the LACAC felt were of historical importance to the community and wanted to preserve. The conflict demonstrated the need for greater levels of co-operation and communication between different organizations when dealing with conservation issues related to the riverine environment. In the city of Cambridge, agreements have been worked out with the GRCA on the preservation of historically significant buildings and structures on the floodplain. It has been recommended that other riverside communities also adopt measures which identify significant heritage structures to deal with possible GRCA flood control adaptation measures (Bennett and Mitchell, 1983). The effort of the GRCA to develop a heritage preservation policy in recent years may aid in avoiding such conflicts in the future.

Some physical adjustments to the riverine environment can be seen as development stresses which have negative consequences on the riverine environment. Dams and weirs create reservoirs or holding ponds which can increase sedimentation and eutrophication in these areas. Channel alterations can disrupt streambed life and the habitat of certain fish species. The removal of riverside vegetation for construction projects such as dyking and the creation of recreation areas on many small streams can raise water temperature levels. These stresses are also shown on Map 4.

ISSUES AND PLANNING

The future course of the strategies for human adaptation to the riverine environment in the Grand River valley is a major issue with regard to heritage features. It is assumed that agencies such as the GRCA and OMNR will continue to exercise and develop an integrated resource management strategy for the valley to control flooding, augment low flows, improve water quality, develop natural heritage resources and provide recreation opportunities for valley residents. These agencies, especially the GRCA, are also attempting to expand their conservation efforts into such areas as human heritage preservation. A main issue of concern in this regard is whether these agencies will have the resources in the future, in terms of manpower and funding, to maintain or expand their current levels of resource management involvement in the valley. The recent review of Ontario's conservation authorities by the province points to the difficulties that conservation authorities are experiencing in developing programs which are not seen to be in conflict with other agencies, as well as in obtaining provincial financial backing for new programs (OMNR, 1988).

Another issue with regard to human adaptation to the river is the emergence of a renewed focus by expanding, central-basin municipalities on utilizing river waters to supplement existing urban groundwater supplies. The recent Mannheim water recharge project of the Regional Municipality of Waterloo involves the withdrawal of 16 million gallons of water per day from the Grand River by 1992 (Burt, 1988). It is expected that return flows will compensate for this withdrawal.

Many significant human-enhanced heritage areas involve a large range of human activities occurring in close proximity to each other. In an area such as the Dunnville wetlands, for instance, recreation activities such as power boating have the potential to disrupt sensitive fish habitats and rare bird species. Approval has recently been given by the Ontario government for financial support for the construction of a new lock to enable recreational boating

traffic to pass upstream to Cayuga and eventually perhaps to Caledonia and Brantford, paralleling the old 19th century historic canal and river traffic. An environmental assessment is reportedly involved in this planning but it will have to be wide in scope to cover noise, potential boating traffic, new marina facilities, pollution, and other potential effects on this river corridor.

In light of the foregoing, it is recommended that:

1. The wildlife, recreational and other benefits of impoundments or other human adaptations to the river be formally recognized and planned for in current and future projects.
2. The Grand River Forest area be recognized as a unique, relatively undisturbed, free-flowing river reach, the value of which is evident by its forested banks, Carolinian wildlife species, and recreation opportunities. It should be realized that this area deserves very careful protection as a vital human, natural, and recreational resource.
3. Comprehensive environmental impact assessments should be applied to any project proposals in the significant areas identified in this report.
4. The significance of the heritage areas identified on Map 3 in *The Human Heritage of the Grand River Valley* (Dennis and Skibicki), should be provided for in the revised basin management plan and corridor studies now underway in the watershed.
5. Improved information, communication and co-ordination services should be organized among the major agencies and groups in the Grand River valley, with the GRCA taking the initiative because of its experience in basin-wide planning. Among the measures which might be encouraged in this regard are an inter-agency heritage co-ordinating committee, an enhanced monitoring and reporting program, and a citizens' forum which could meet on an annual basis to review issues and make recommendations to appropriate agencies and groups.

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PERSONAL COMMUNICATIONS

- Veale, B.J. Policy and Research Planner, Grand River Conservation Authority, Cambridge, Ontario.

TABLE 1
Major Floods in the Grand River Valley

Year	Season	Cause of Flooding	Notable Effects
1833	Feb-Mar	--	One of the 4th or 5th worst floods of the 19th century
1857	Feb	Ice jams; narrowing of the river due to retaining walls; heavy snow and hard frost during the winter	One of the worst floods in the history of the watershed
1869	Apr	Flash flood soon after ice breakup; attributed to the bursting of a dam higher up the river; heavy thunderstorms	Very destructive at Guelph
1878	Sep	Series of thunderstorms	High water levels at Elora, Bridgeport and Fergus; extensive crop damage in rural areas
1883	Aug	Heavy rains	Community of Haysville disappeared; worst recorded flooding in Nith Valley; severe damage throughout the watershed
1894	Mar	Ice jams and ice buildup	Heavy flooding in Brantford
1898	Mar	Early thaw, ice jams and heavy rains above Blair	Property losses similar to 1857 flood
1912	Apr	Quiet breakup of ice above Bridgeport; heavy rain	High water levels on Speed River
1922	Mar	Ice jam and breakup	Similar to 1912 flood; losses mainly at Galt
1929	Apr	Severe thunderstorms in upper watershed	Severe damage at Galt Guelph, Paris and Brantford; damage to Penman factory in Paris

Year	Season	Cause of Flooding	Notable Effects
1947	Apr	Ice breakup on lower river; heavy rain; ice breakup on Nith; Conestogo, and Speed	Worst flood in 32 years in New Hamburg; high water at Galt; sudden release of water by Shand Dam may have made flooding worst
1948	Mar	Unusually thick ice; ice jams and breakup	Record flooding on Nith, Conestogo and Speed; highest ever water levels at Galt
1950	Apr	Heavy rain	Heavy losses in New Hamburg, Brantford, and Waterloo
1954	Oct	Hurricane Hazel	Record flood on Grant; Kitchener sewage plant put out of operation; 200 residents evacuated in Bridgeport
1965	Feb	Heavy rain and sleet	Flooding in Galt
1974	May	Heavy rainfall	Most damaging flood on record in the valley; \$8,000,000 damage; record flood levels at Bridgeport and Cambridge
1979	Mar	Spring thaw	Flood damage in Paris
1981	Feb	Ice jam	Flood damage at West Montrose; ice jam dynamited
1986	Sep	Heavy rains	Flooding of low lying areas in New Hamburg; roads washed out

Sources:

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TABLE 2

**Major Dams and Weirs Operated by
The Grand River Conservation Authority
(as of March, 1990)**

Dam/Weir	Date Completed as Acquired	River	Original Purpose	Current Functions and Land Uses
1. Shand	1942	Grand	First and largest control structure on the Grand River; main purpose was flood control and low flow augmentation	<ul style="list-style-type: none"> • Flood control area • Fish survey and stocking program • Forested • Tree nursery • Trails • Swimming; boating • Picnicking • Snowmobiling • Cottaging
2. Luther	1954	Black Creek	Second major storage reservoir constructed in the basin; the Luther Lake depression seemed suitable for water storage and the regulation of outflow.	<ul style="list-style-type: none"> • Flood control area • Demonstration area • Wilderness area • Wildlife management area • Controlled hunting area

Dam/Weir	Date Completed as Acquired	River	Original Purpose	Current Functions and Land Uses
3. Conestogo	1958	Conestogo	Construction stemmed from the need for additional flood protection after the Hurricane Hazel flood; flood control was felt to be needed on the tributaries of the Grand; third major control structure in the valley.	<ul style="list-style-type: none"> • Wildlife improvement and inventory • Forested • Wetland creation programs • Crown lands • Trails • Picnicking • Snowmobiling • Flood control area • Controlled hunting area • Fish survey and stocking • Forested • Wetland creation programs • Trails • Swimming; boating • Picnicking; camping • Snowmobiling • Cottaging
4. Byng Weir 4	1964	Sulphur Creek	To allow fish around the Dunnville Dam.	<ul style="list-style-type: none"> • Fish ladder
5. Laurel Creek	1966	Laurel Creek	Flood control on Laurel Creek; prevention of flooding in downtown Waterloo area;	<ul style="list-style-type: none"> • Flood control area

Dam/Weir	Date Completed as Acquired	River	Original Purpose	Current Functions and Land Uses
			sewage treatment needs.	<ul style="list-style-type: none"> • Nature Centre • Trails • Swimming; boating • Picnicking; camping
6. Shade's Mills	1970	Galt Creek	Flood control on Galt Creek; and in downtown Cambridge; water recharge for local wells; recreational uses.	<ul style="list-style-type: none"> • Flood control area • Forested • Fish surveys and stocking • Trails • Swimming; boating • Picnicking • Cross-country skiing
7. Wellington	1958	Speed	Flood control; holding ponds.	<ul style="list-style-type: none"> • Floodplain property • Agreement area • Picnicking
5. Taquanyah	1966	Mill Creek	Flood control.	<ul style="list-style-type: none"> • Flood control area • Habitat improvement studies • Nature Centre • Trails • Picnicking; camping
9. Victoria Mills	1967	Mackenzie Creek	Flood control.	<ul style="list-style-type: none"> • Flood control area

Dam/Weir	Date Completed as Acquired	River	Original Purpose	Current Functions and Land Uses
10. Dunnville	1964	Grand	Reconstruction of the original dam built in 1829 for the purpose of feeding water into the Welland Canal.	<ul style="list-style-type: none"> • Recreation area • Trails • Swimming; boating • Picnicking; camping
11. Columbia	1967	Laurel Creek	Flood control on Laurel Creek; recreational uses.	<ul style="list-style-type: none"> • Flood control area • Passive recreation
12. Elora Bissel	1965	Grand	Flood and erosion control; recreational uses; mill race once used for water power.	<ul style="list-style-type: none"> • Floodplain property • Swimming • Picnicking
13. Breslau	1961	Hopewell Creek	Flood control; recreational uses.	<ul style="list-style-type: none"> • Flood control area • Picnicking
14. Grand Valley	1957	Grand	Flood control; recreational uses.	<ul style="list-style-type: none"> • Floodplain property • Agreement area • Picnicking; camping
15. Everton	1966	Eramosa	Flood control; holding pond for mill; recreational uses.	<ul style="list-style-type: none"> • Flood control area
16. New Hamburg	1966	Nith	Flood control in New Hamburg; recreational uses.	<ul style="list-style-type: none"> • Floodplain property • Agreement area • Swimming; boating • Picnicking

Dam/Weir	Date Completed as Acquired	River	Original Purpose	Current Functions and Land Uses
17a. Rockwood No. 1	1960	Eramosa	Original holding pond provided water power for mill operations; reconstructions served to enhance various recreational opportunities.	<ul style="list-style-type: none"> • Recreation area • Wilderness area • Fish stocking • Trails • Swimming; boating • Picnicking; camping
17b. Rockwood No. 2	1960	Eramosa	Originally a holding pond.	<ul style="list-style-type: none"> • Recreational uses.
18. Wellesley	1957	Local stream	Flood control; recreational uses.	<ul style="list-style-type: none"> • Flood control area • Agreement area • Picnicking.
19. Chicopee	1969	Local stream	Recreational uses; water level in the pond maintained in consultation with the Chicopee Ski Club.	<ul style="list-style-type: none"> • Recreation area • Agreement area • Picnicking • Cross-country skiing • Snowmobiling
20. Floradale	1968	Canagagigue Creek	Flood control.	<ul style="list-style-type: none"> • Flood control area
21. Upper Ayr	1965	Cedar Creek	Flood control; holding pond.	<ul style="list-style-type: none"> • Flood control area • Floodplain property
22. Queen Street (Galt)	1971	Grand	Flood control in downtown Cambridge. Original 19th century holding pond was	<ul style="list-style-type: none"> • Flood control area

Dam/Weir	Date Completed as Acquired	River	Original Purpose	Current Functions and Land Uses
			used to supply water power for mills.	
23. New Dundee	1971	Alder Creek	Reconstructed dam (original dated from 1830); flood control on Alder Creek.	<ul style="list-style-type: none"> • Flood control area
24. Baden	1971	Baden Creek	Holding pond.	<ul style="list-style-type: none"> • Recreational uses • Picnicking
25. Chillico	1971	Chillico Creek	Flood control; holding pond.	
26. Wilkes Dam	1972	Grand	Holding pond.	<ul style="list-style-type: none"> • Water intake • Hydro generation
27. Woolwich	1974	Canagagigue	Augmentation of low summer flow rates in Canagagigue Creek and lessening the effect of toxic outputs from industries in Elmira.	<ul style="list-style-type: none"> • Flood control area • Picnicking
28. St. Jacobs Mill	1975	Conestogo		<ul style="list-style-type: none"> • Hydro generation
29. Guelph	1976	Speed	The fourth large storage reservoir in the basin; flood control on Speed River	<ul style="list-style-type: none"> • Flood control area • Nature Centre • Resource Management Camp for high school students • Fish population and species inventories • Forested • Trails • Swimming; boating • Picnicking; camping

Dam/Weir	Date Completed as Acquired	River	Original Purpose	Current Functions and Land Uses
30. Damascus	1980	Conestogo	Mitigation of flood hazard associated with Municipal Drain #36	<ul style="list-style-type: none"> • Flood control area • Forested • Swimming • Picnicking
31. New Caledonia	1980	Grand	Original purpose was to serve the Grand River Navigation Company and to provide power for mills; today, holds back water for a number of boating and water-based recreational opportunities further upstream.	<ul style="list-style-type: none"> • Floodplain property • Agreement area • Fish ladder • Fish species surveys • Provisions for future boat lock • Heritage landmark • Swimming; boating • Picnicking
32. Drimmie Dam	1984	Grand	Originally a holding pond for water; renovated by GRCA.	

TABLE 3
Streamflow Discharges in the Grand River

	Mean Monthly Discharge *	Below Shand Dam	Galt	Brantford
1915	Lowest	--	3.21	5.57
to	Highest	--	151.00	394.00
1920	Average	--	31.76	55.67
1950	Lowest	1.41	6.66	12.00
to	Highest	43.90	173.00	208.00
1955	Average	9.43	40.40	58.00
1960	Lowest	0.35	5.25	6.39
to	Highest	52.50	201.00	296.00
1965	Average	6.50	28.60	42.31
1970	Lowest	1.39	9.52	15.30
to	Highest	40.10	179.00	254.00
1975	Average	8.23	37.05	55.61
1980	Lowest	2.50	11.30	18.50
to	Highest	48.80	157.00	248.00
1985	Average	10.18	42.11	67.37
	Drainage Area: (in sq. km.)	800	3,520	5,210

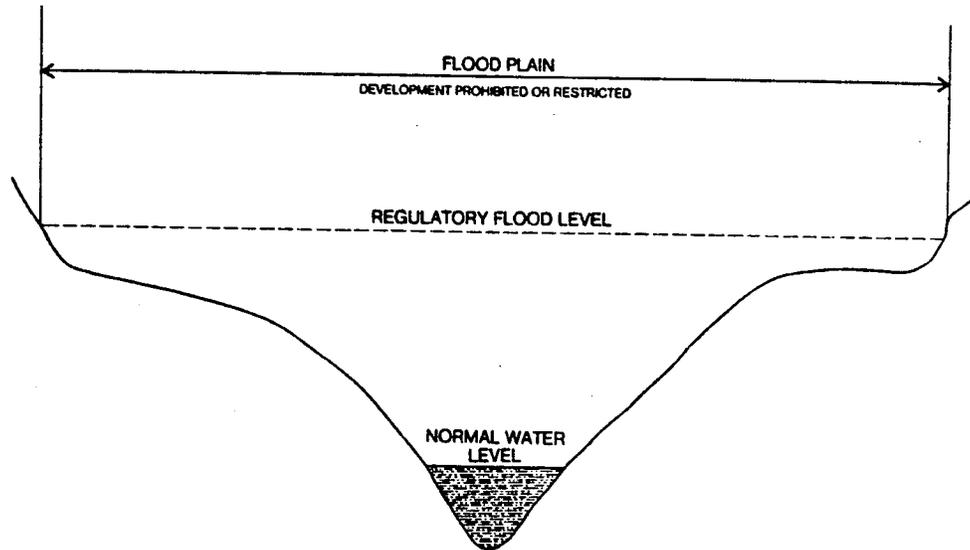
* Discharges in cubic metres per second

Source:

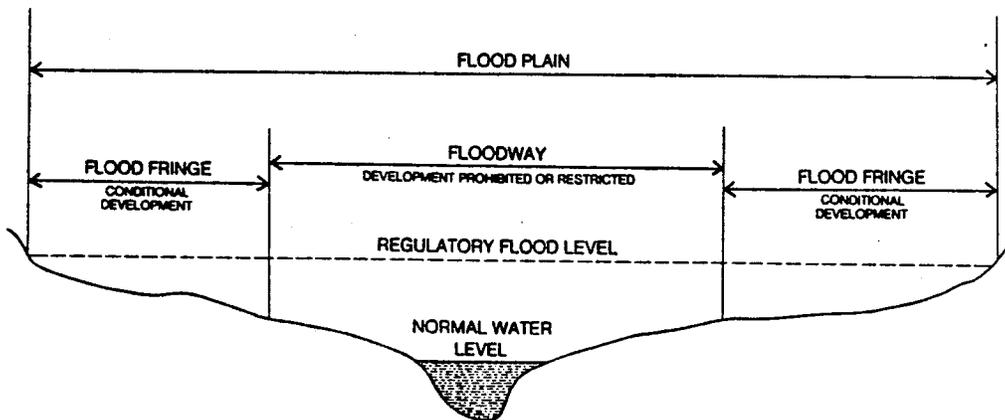
Historic Streamflow Summary: Ontario (1987). Environment Canada. Inland Waters/Lands Directorate, Water Resources Branch, Water Survey of Canada, Ottawa.

FIGURE 1

ONE-ZONE CONCEPT



TWO-ZONE FLOODWAY-FLOOD FRINGE CONCEPT



(Source: Ontario Ministry of Natural Resources and Ontario Ministry of Municipal Affairs, *Policy Statement: Flood Plain Planning* (1988))

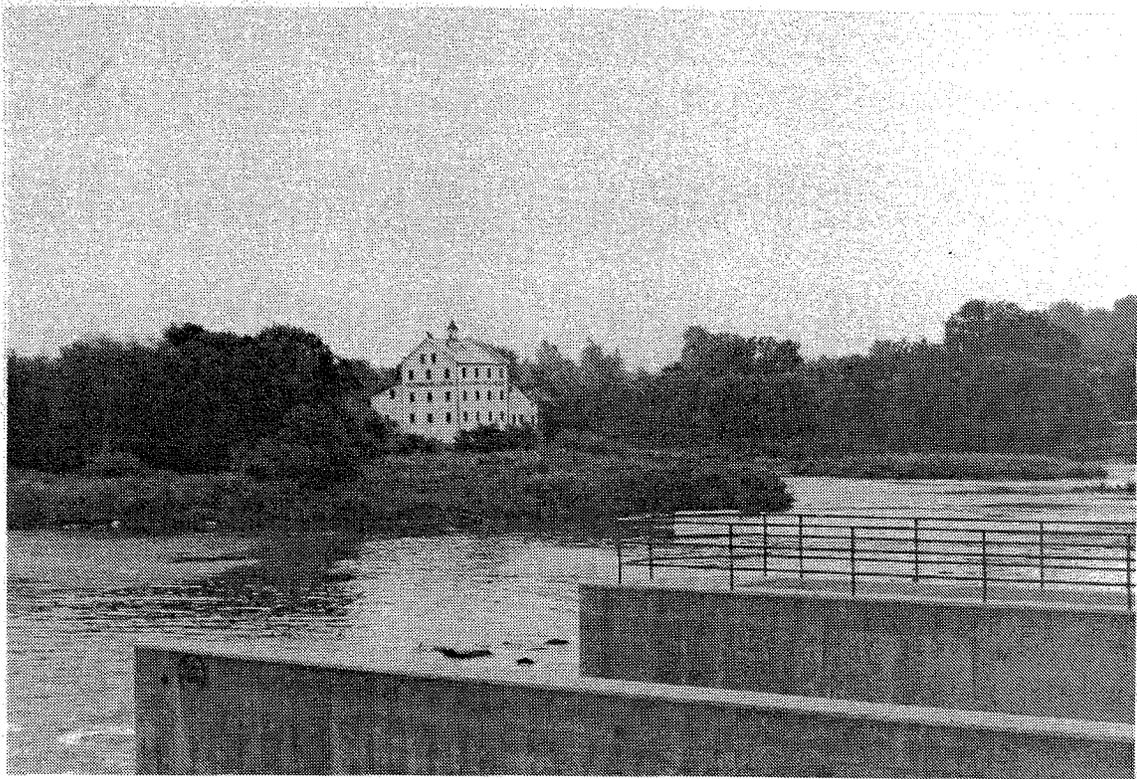


FIGURE 2. The Caledonia Mill as seen from the renovated weir.



FIGURE 3. The weir on the Grand River in downtown Cambridge (Galt).

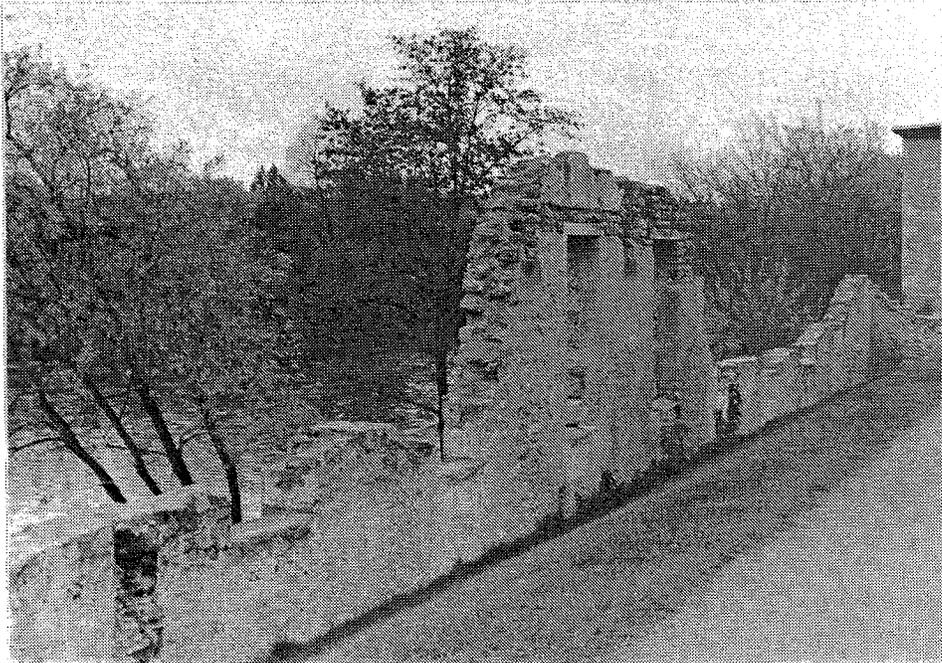


FIGURE 4. A Riverside park along the Grand River in Cambridge (Galt) created from an old industrial building.

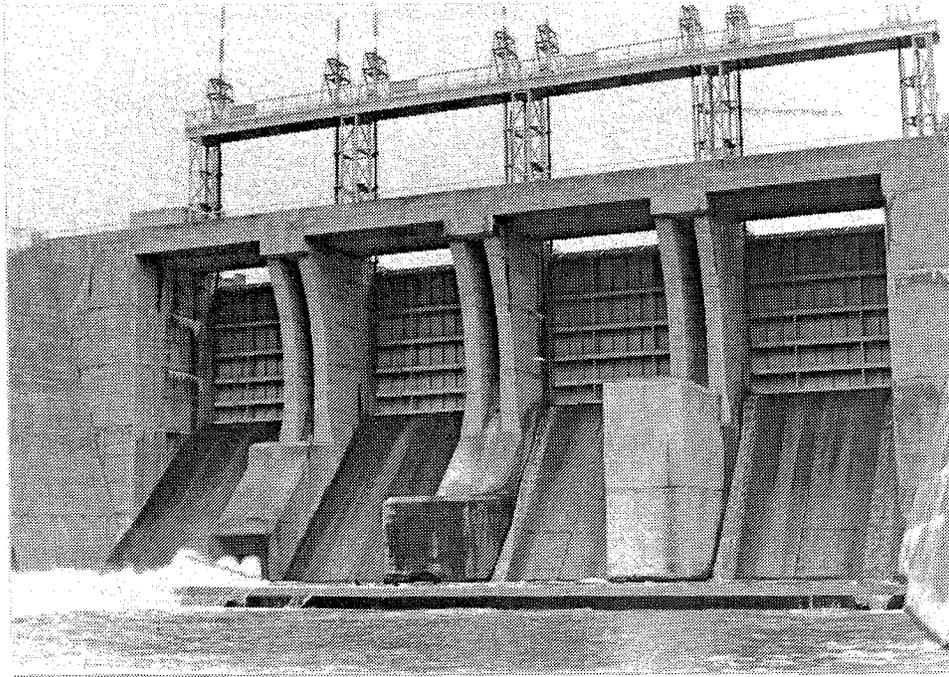


FIGURE 5. The Shand Dam located at Lake Belwood.

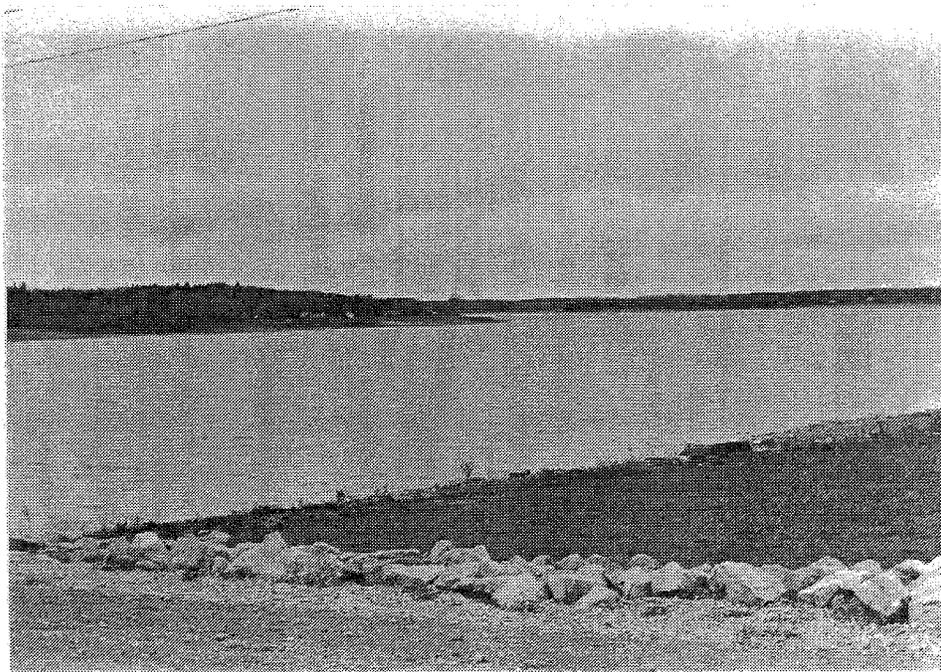


FIGURE 6. The Belwood Lake Reservoir.



FIGURE 7. The Grand River Forest seen from the Spottiswoods Lookout south of Glen Morris.

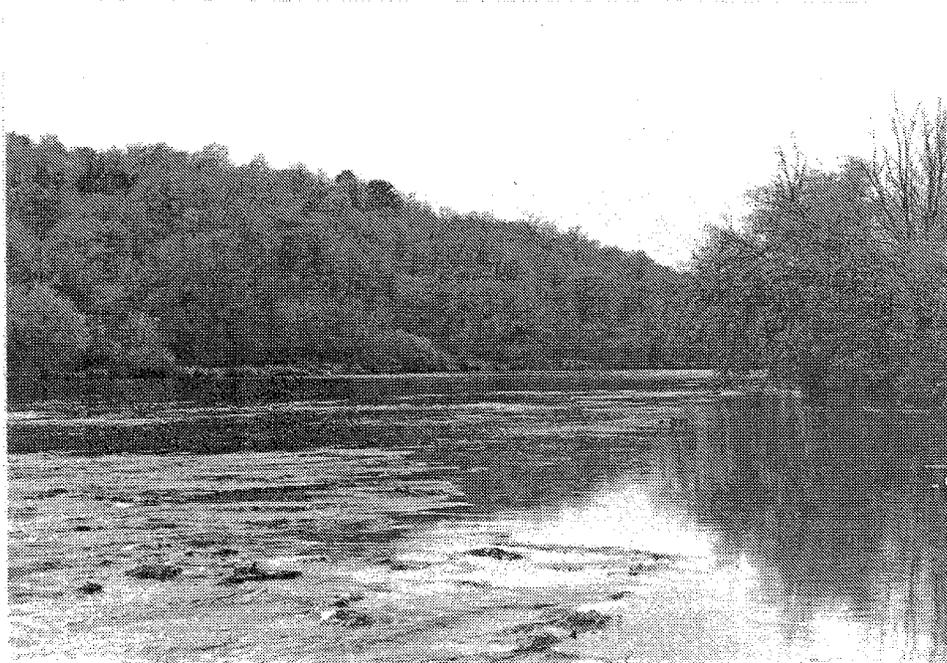
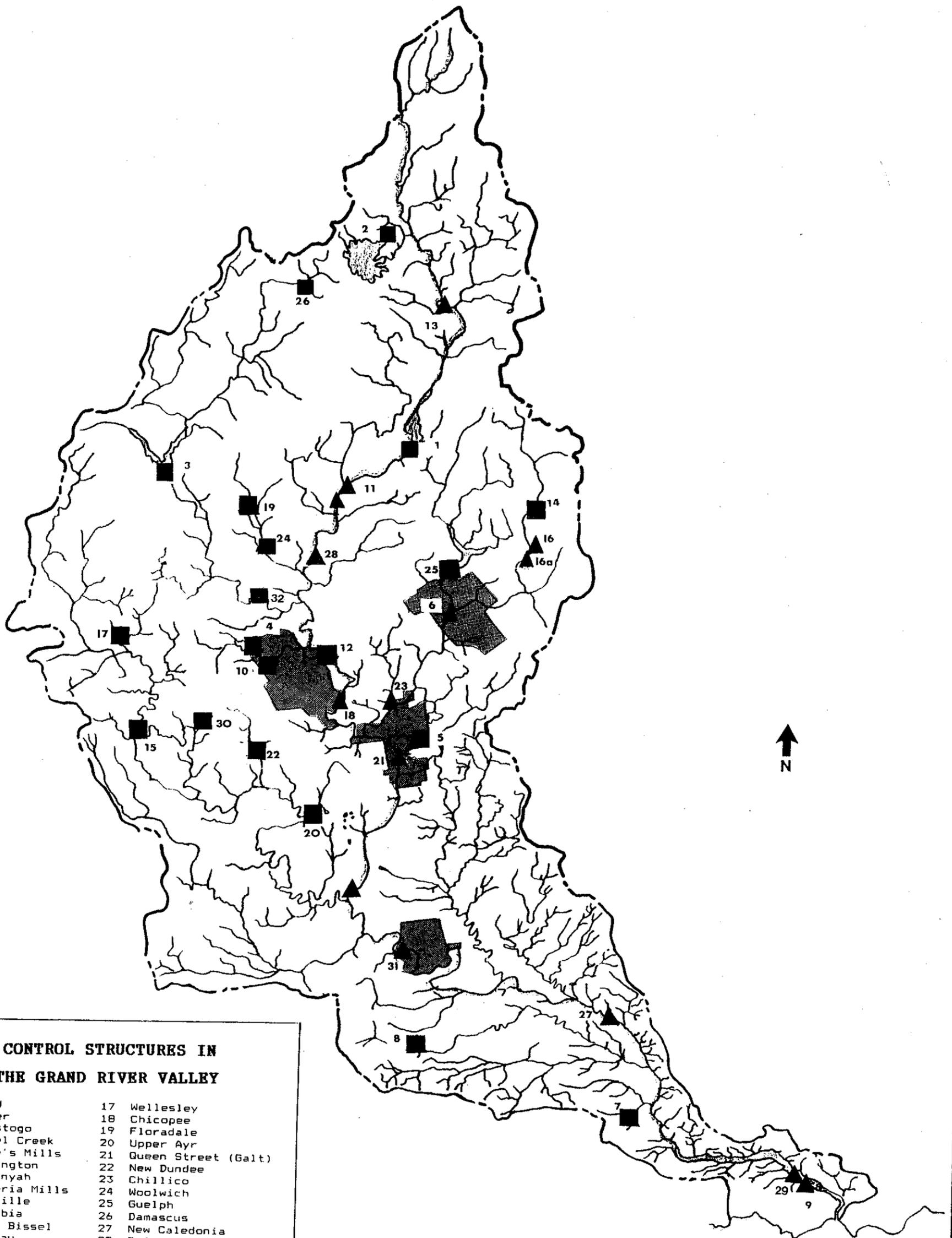


FIGURE 8. The Grand River Forest, a rich natural corridor, as seen from ground level, north of Glen Morris.

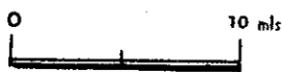
THE GRAND RIVER VALLEY



CONTROL STRUCTURES IN THE GRAND RIVER VALLEY

- | | |
|-------------------|------------------------|
| 1 Shand | 17 Wellesley |
| 2 Luther | 18 Chicopee |
| 3 Conestogo | 19 Floradale |
| 4 Laurel Creek | 20 Upper Ayr |
| 5 Shade's Mills | 21 Queen Street (Galt) |
| 6 Wellington | 22 New Dundee |
| 7 Taquanyah | 23 Chillico |
| 8 Victoria Mills | 24 Woolwich |
| 9 Dunnville | 25 Guelph |
| 10 Columbia | 26 Damascus |
| 11 Elora Bissel | 27 New Caledonia |
| 12 Breslau | 28 Drimmie Dam |
| 13 Grand Valley | 29 Byng Weir 4 |
| 14 Everton | 30 Baden |
| 15 New Hamburg | 31 Wilkes Dam |
| 16 Rockwood No.1 | 32 St. Jacobs Mill |
| 16a Rockwood No.2 | |

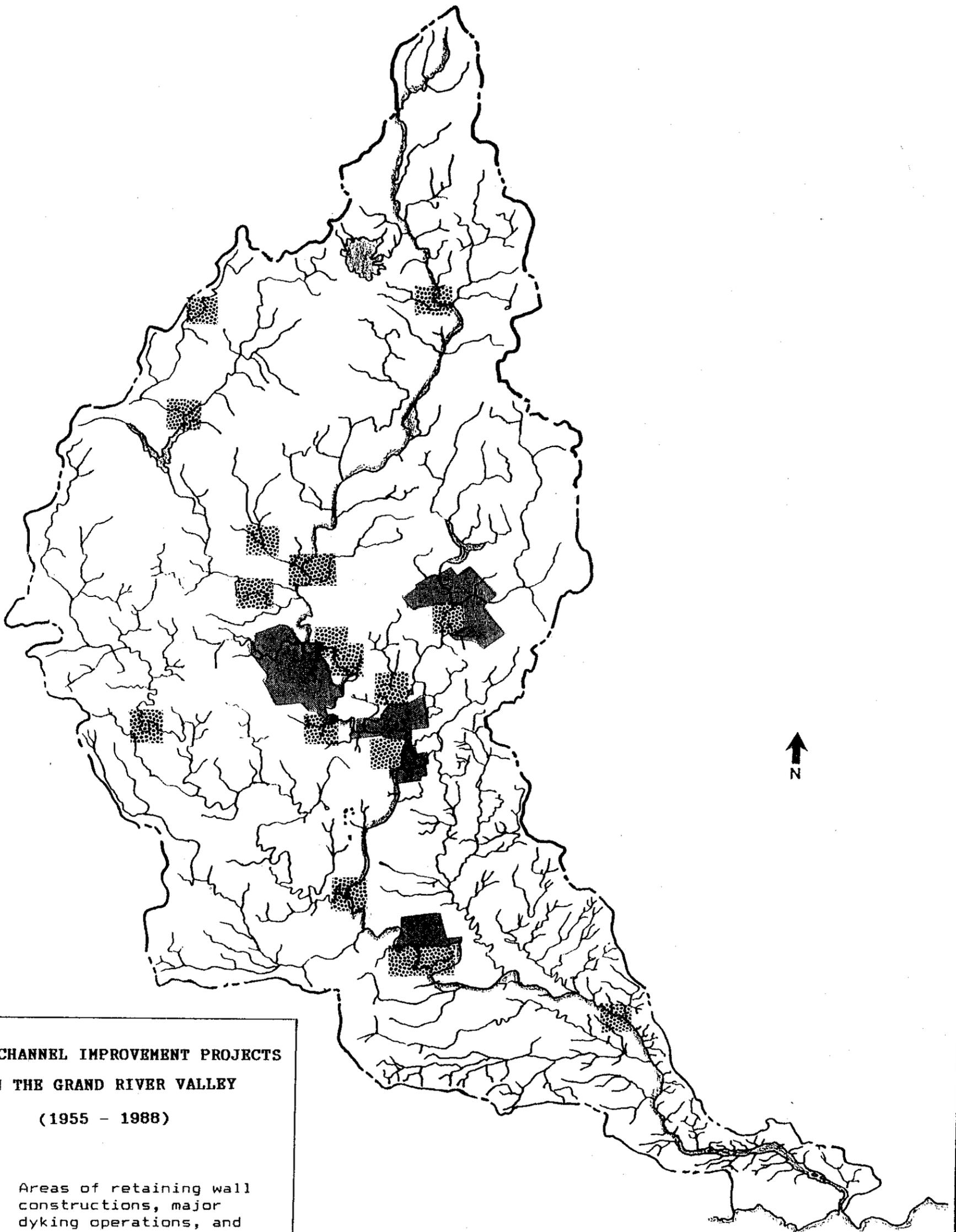
- | | |
|---------|---------------------|
| ■ Dams | ■ Major Urban Areas |
| ▲ Weirs | |



MAF 1

(Sources: Mitchell et al, 1978; Veale, 1979, Grand River Conservation Authority, Annual Reports, 1970 to 1988.)

THE GRAND RIVER VALLEY



MAJOR CHANNEL IMPROVEMENT PROJECTS IN THE GRAND RIVER VALLEY (1955 - 1988)



Areas of retaining wall constructions, major dyking operations, and major channel alterations by dredging and stream bank erosion control



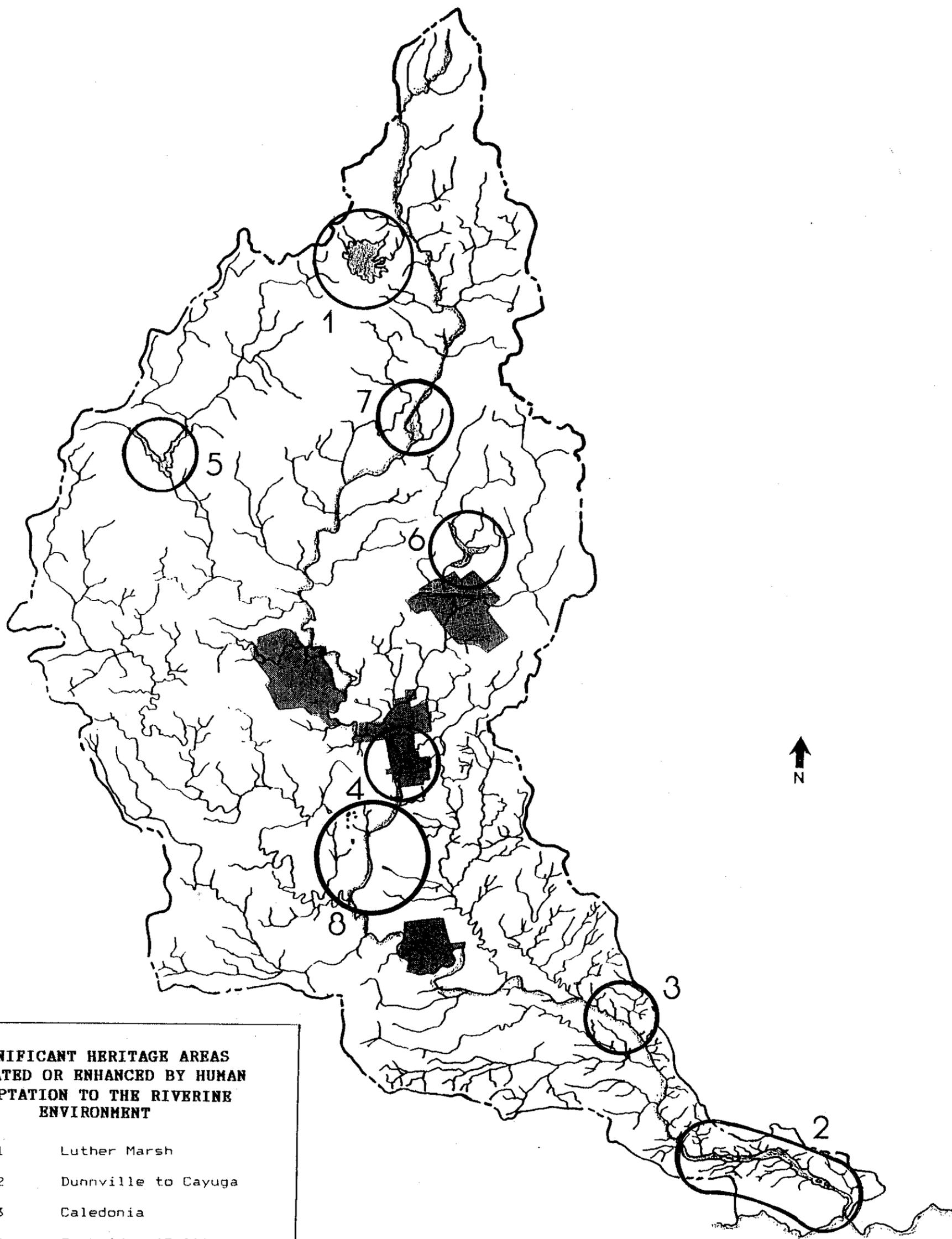
Major Urban Areas

0 10 mls

MAP 2

(Sources: Mitchell et al, 1978; Veale, 1979, Grand River Conservation Authority, Annual Reports, 1970 to 1988.)

THE GRAND RIVER VALLEY



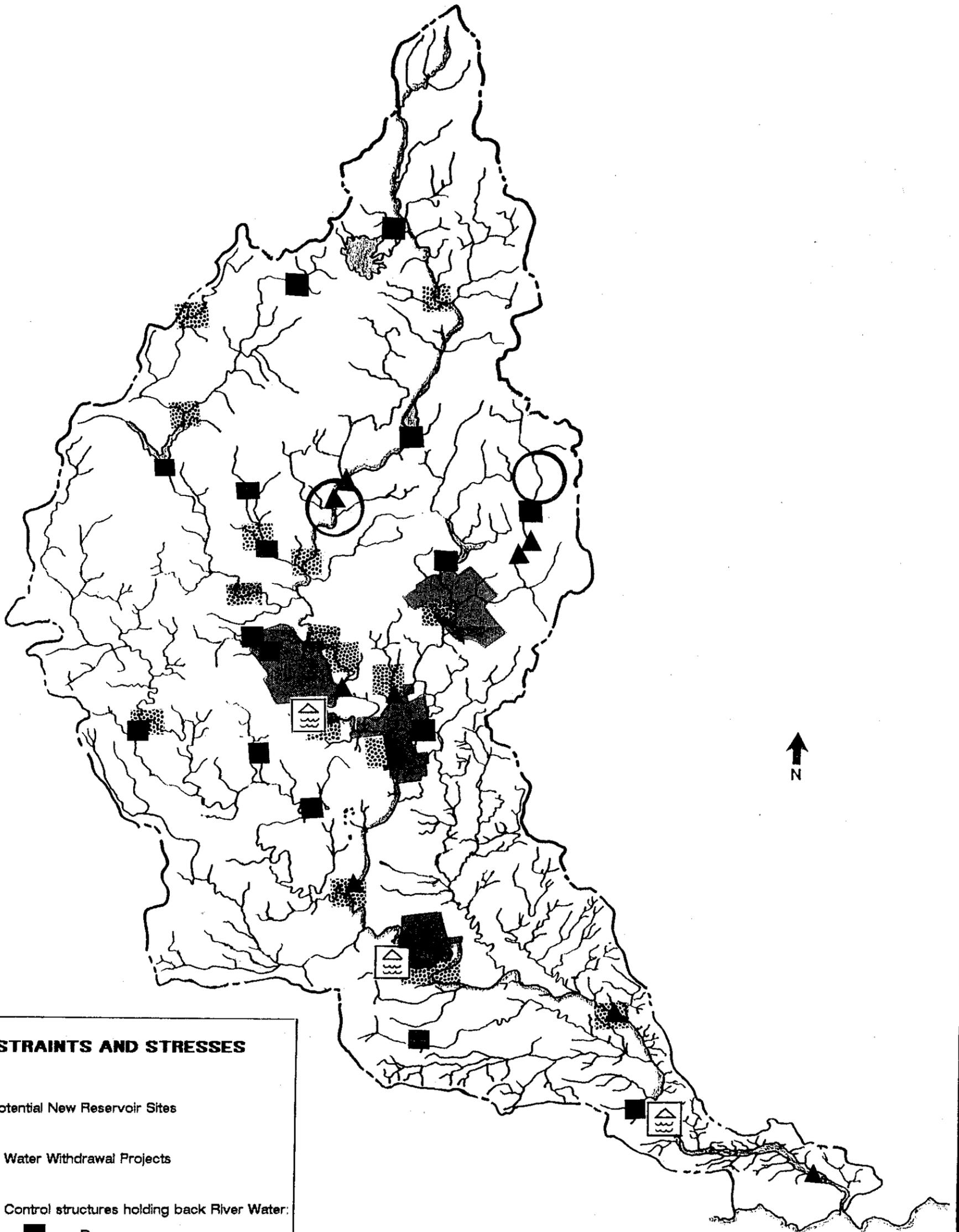
SIGNIFICANT HERITAGE AREAS CREATED OR ENHANCED BY HUMAN ADAPTATION TO THE RIVERINE ENVIRONMENT

- 1 Luther Marsh
- 2 Dunnville to Cayuga
- 3 Caledonia
- 4 Cambridge (Galt)
- 5 Conestogo Lake
- 6 Guelph Lake
- 7 Belwood Lake
- 8 Grand River Forest

0 10 miles

MAP 3

THE GRAND RIVER VALLEY



CONSTRAINTS AND STRESSES

 Potential New Reservoir Sites

 Water Withdrawal Projects

Control structures holding back River Water:

 Dams
 Weirs

 Major Channel Alterations (1955 - 1988)

 Major Urban Areas

0 10 mls

MAP 4

Water Quality and Quantity and Grand River Heritage*

Deborah S. Hind

CONTEXT

Water quality is an essential component in the attainment of Canadian Heritage River status, as is evidenced by the nomination of previous Canadian Heritage Rivers. The selection of relevant criteria by which to assess water quality is not often clear, however, because of the numerous methods and parameters available. These choices are often reflections of the use to be made of the river and the associated users.

The quality of water in the Grand River is "...not now, nor likely to be in the future, of the high quality associated with more northern Heritage River Systems..." (Nelson and O'Neill (eds.), 1989). However, during the past twenty-five years the quality of water within the Grand River basin has improved, permitting the occurrence of numerous recreational activities and human heritage experiences.

Previously nominated Canadian Heritage Rivers tended to be selected on the basis of their natural and pristine state. Unlike these rivers, however, the Grand River enjoys a two-hundred-year settlement history and, as such, its nomination is based largely upon human and recreational values. Thus it is difficult to compare the water quality of the Grand River with previously designated Canadian Heritage Rivers.

Currently, water quality in the Grand River is monitored by the Ontario Ministry of the Environment (OMOE), the Ontario Ministry of Health (OMOH), and the Grand River Conservation Authority (GRCA) (Map 1). Parameters monitored by the GRCA and the OMOE vary with location depending on land use (Mason, 1989). Table 1 provides some parameters measured. Various studies on fish and aquatic species within the Grand River basin also provide indications of water quality and trends (Baker, 1987; Stegelmeier, 1986).

River flow is also significant in determining human heritage and recreational integrity. Water must be of a sufficient quantity to permit those recreational activities specific to an area and not to detract from enjoyment and maintenance of historic or human heritage features. The numerous water engineering endeavours along the Grand River constitute a significant portion of the historical background of the river and often have enhanced the available recreation opportunities.

PATTERNS

Several studies have been conducted which examine both the quality and the quantity of the Grand River (Baker, 1987; Grand River Implementation Committee, 1982; Hore and Ostry, 1978;

* After completion of this report in January 1990, pollution problems with DMNA arose in the valley, which are not considered in the report.

Stegelmeier, 1986). Both temporal and spatial patterns of water quality and quantity are observed in the Grand River basin.

Water Quality

Generally, water quality in the Grand River basin has improved during the last twenty years (Baker, 1987; Burt, 1989; Hore and Ostry, 1978; Mason, 1989; Stegelmeier, 1986). Indications of this trend include improved fishing and increased diversity and numbers of aquatic species. It is possible that much of this improvement is attributable to the upgrading of sewage treatment plants within the basin (Burt, 1989:H1).

Despite this gradual improvement, there is evidence of progressive contamination of the Grand River from its headwaters to its mouth at Lake Erie. For the most part, this pollution or use impairment is the direct result of human activities (Grand River Implementation Committee, 1982:4.3). In terms of available phosphorus, point source and private waste disposal contamination has increased while the agriculture contribution has decreased (Hore and Ostry, 1978:49).

The most serious water quality impairment problems are found in the central basin near the cities of Kitchener, Waterloo, Cambridge, and Guelph (Grand River Implementation Committee, 1982). However, various types and degrees of degradation of the Grand River occur along its length.

Pollutants from agricultural runoff occur primarily during the February to April period (Gartner Lee, 1987:17). Recent efforts to stop pollution from farm runoff have produced excellent water quality in the northern portion of the basin. This is evidenced by the recent stocking of trout by Trout Unlimited and the Ontario Ministry of Natural Resources.

Water Quantity

The natural flow regime of the Grand River is highly variable. Within the Grand River basin, water flow is dependent upon seasons, climate, and humans. Twenty basin communities are prone to flooding, the most susceptible of which are Cambridge, Paris, Brantford, New Hamburg, Caledonia, and Dunnville (Grand River Implementation Committee, 1982:6.14). Cambridge and Brantford alone sustain more than eighty-five percent of the average annual flood damages in the Grand River basin (Grand River Implementation Committee, 1982:1.1).

The influence of the Luther, Woolwich, and Guelph dams on water flow are mainly local on the upper Grand River, Canagagigue Creek, and the Speed River; however, the Shand and Conestogo dams influence both local sites and the middle and lower Grand River (Grand River Implementation Committee, 1982). Map 1 in *Human Adaptation to the Riverine Environment* (Skibicki and Nelson), depicts the location of these dams.

With the provision of low flow augmentation, problems of water shortage are generally experienced only during the summer months, especially in the vicinity of large municipal areas which extract water from the river (Grand River Implementation Committee, 1982).

Recent scientific observations have identified a future global atmospheric warming trend. "One of the most dramatic impacts resulting from global climatic change could be alteration in regional hydrologic conditions and subsequent changes in regional water availability, water quality, flood hazard, and other elements of water resources" (Jacobs and

Riebsame, 1989:33-34). Current research on the effects of climate change on lake levels in the northern hemisphere indicates greater runoff earlier in the year but an overall decrease in runoff because of evapotranspiration from land areas due to increased temperatures (Sanderson, 1988:40). This means river flow is generally expected to drop. Based on a 1987 Michigan study by Gleick (Jacobs and Riebsame, 1989) a twenty-five percent reduction in streamflow is expected for the whole Lake Erie basin. Preliminary results obtained from a study conducted by The Water Network, however, indicate only an eight to ten percent reduction in streamflow for the southern end of the Lake Erie basin. This includes the Grand River watershed. Research on the warming effect on rivers has been limited (Sanderson, 1989), however, work conducted by Gleick (Jacobs and Riebsame, 1989:41) on the Sacramento River basin indicates similar trends to those found on the Great Lakes.

SIGNIFICANCE

In general, water quality is not considered to be high enough to merit designation of the Grand as a Canadian Heritage River in its own right, but it is high enough to support the heritage features and recreation opportunities for which the river is being recommended for designation.

Water quality has improved substantially since the 1960s with improved sewage pollution control. The quality is considered to be good to very good, according to the criteria used by the OMOE and the GRCA. The Grand River currently meets all five water quality characteristics of importance to the recreational use of water for non-contact recreation as endorsed by the Canadian Council of Resource and Environment Ministers (CCREM, 1987). These include vector and nuisance organisms and phytoplankton in the nuisance category; and aesthetics, oil and debris in the physical and chemical category. In certain short sections, aquatic vascular plants may pose problems to some kinds of boating but not canoeing. Programs to reduce phosphorus nutrient enrichment in the streams of the Grand River watershed are being implemented by the GRCA with assistance from OMOE and OMAF. These measures will serve to reduce the growth of aquatic vascular plants.

Good water quality is a necessary criterion for establishing a firm fisheries and wildlife base as observed in the Luther Marsh, Cambridge-Paris, and Dunnville areas. Recreational pursuits such as canoeing in the middle Grand River and boating in the lower reaches of the river are supported by an adequate quantity of water. Both adequate and acceptable water quality and quantity also support the variety of fish species observed in the Grand River.

Luther Marsh

The water quantity in Luther Marsh is regulated by a dam, therefore a sufficient quantity is maintained to support the biological life and recreational pursuits of this area. A recent literature review by Gehrels and Mulamootil (1988) regarding the functional processes of wetlands indicates wide agreement among researchers that:

"for individual storm events,....wetlands frequently minimize peak flows. The large surface areas of wetlands act as storage places for flood waters, and emergent vegetation, such as *Typha* plants, retard the flow of water." (Sather and Smith, 1984:54)

This view is accompanied by the belief that water is slowly released from wetlands in order to sustain base flow and that seasonal runoff flow variations are enhanced. Contrary to this point of view is the belief that precipitation is rapidly displaced by the high water table of wetlands, thus contributing to downstream flooding. Water quality in Luther Marsh is

generally quite good, and future alterations in this area appear limited and unlikely to have a negative effect on water quality or quantity.

Elora

Water quality in the Elora area appears generally good, supported by the presence of a variety of warm water fish species (Postma and Sandilands, 1977:9). The presence of the Grand River in the town of Elora and in the nearby gorge contributes to the aesthetic setting of this area. The increased capacity of the sewage treatment plant at Elora is capable of meeting the village's growth to the year 2006; however, any further expansion of this plant will require tertiary treatment (Grand River Implementation Committee, 1982:7.2; Irwin, 1989).

St. Jacobs

Presently, water quality conditions in the Conestogo river downstream from St. Jacobs are acceptable; however, further expansion of the sewage treatment plant including tertiary treatment will soon be required to meet future growth (Grand River Implementation Committee, 1982:7.3; Irwin, 1989).

Rockwood

Water quality in the Eramosa River is not significantly affected by wastewater discharges from this community (Grand River Implementation Committee, 1982:7.6). Sewage from Rockwood is piped to Guelph for treatment, and effluents are discharged into the Speed River. Few other sources seem likely to impair the generally good quality of water in this area in the future.

Cambridge-Paris

Present river flows are capable of supporting a range of recreational activities and a diverse human heritage program in this area. Current wastewater discharge has minimal impact on water quality in downstream reaches of the Grand River including the important area of the Grand River Forest (Grand River Implementation Committee, 1982:7.5). Expansions are currently planned for the municipal sewage treatment plant at Galt, and will include tertiary treatment (Irwin, 1989).

Brantford

Oxygen-consuming wastes discharged from the Brantford sewage treatment plant do not significantly affect dissolved oxygen levels in the lower Grand River (Grand River Implementation Committee, 1982:6.16). This is most likely attributable to the substantial streamflow, high assimilative capacity of the river, and lack of nuisance levels of aquatic plant growth in this stretch of the river. However, future expansions of the sewage treatment plant may require tertiary treatment to prevent water quality degradation (ibid.).

Cayuga

Few problems are anticipated downstream from the wastewater treatment plant at Cayuga (Grand River Implementation Committee, 1982:7.6).

Dunnville

Present water quality in the Dunnville area is good enough to support a diverse wetland habitat and an abundance of fish. Glooschenko et al. (1987:189,194) identify the Dunnville and

Grand River marshes as able to improve water quality, trap nutrients, and reduce peak floods. At present, no significant water quality problems are experienced below Dunnville due to the sewage treatment plant (Grand River Implementation Committee, 1982:7.6).

CONSTRAINTS

Although water quality of the Grand River is presently capable of sustaining numerous recreational and heritage resources, several constraints limit the addition of new uses and to some extent impair current uses. Water-related problems on the Grand River have been placed into three main categories: water quality degradation, flooding, and low flow.

Water Quality Degradation

The various land uses within the Grand River basin have contributed to and compounded the water quality problems associated with this river. Water quality within the Grand River basin is affected by both point and non-point sources, especially sewage treatment, past disposal practices, landfill siting, agriculture and rural subdivision development (Irwin, 1989). These practices impact on water quality, fisheries, water supplies, and recreation.

The major types of pollutants responsible for water quality degradation in the Grand River, their effects on water quality, and their sources are described below.

Aggregate Mining

"Monitoring data suggest that the mining of aggregates for the construction industry (sand, gravel, crushed stone, lime, etc.) does not affect receiving-stream water quality provided some method of waste-water treatment is used" (Hore and Ostry, 1978:vii).

Bacterial Contamination

The OMOE guidelines for acceptable limits of bacteria are occasionally exceeded in the upper Grand River downstream to the confluence of Canagagigue Creek and in the lower Grand River downstream from Caledonia (Grand River Implementation Committee, 1982:6.20). This occurrence is, however, sporadic in nature and varies with season and from place to place (Mason, 1989). Bacterial contamination is generally localised since micro-organisms are not transported downstream great distances from pollution sources (Grand River Implementation Committee, 1982:6.21; Hore and Ostry, 1978:53).

Bacterial contamination poses a potential risk to public health, especially if the receiving water is to be used for recreational activities or public water supplies (Grand River Implementation Committee, 1982; Hore and Ostry, 1978:44). Summer is the crucial time for bacterial contamination with respect to recreation since water contact sports occur during this period (Mason, 1989).

In urban areas, any high bacteriological levels may be attributed to ineffective chlorination at sewage treatment plants, illegal sanitary waste discharges to storm sewers or directly to watercourses, and urban stormwater runoff contamination by fecal matter from wild animals or pets (Grand River Implementation Committee, 1982:6.20; Hore and Ostry, 1978:53).

Agricultural contamination usually results from runoff carrying fecal matter from manure piles, barnyards, feedlots, and pasture lands and/or from livestock and wildlife defecation directly into streams (Grand River Implementation Committee, 1982:6.20).

Watering and seepage from malfunctioning septic tank systems may also contribute to this problem although few documented cases have been reported (Mason, 1989).

Chloride

Increasing levels of chloride are found in the Grand River, especially at its mouth (Hore and Ostry, 1978:52). Highway de-icing salts contribute the most to this source of pollution, although sanitary landfills and powder and spray irrigation contribute minor amounts (ibid.).

Nutrient Enrichment and Aquatic Plant Growth

The OMOE guideline for total phosphorus allowed is "...exceeded virtually everywhere in the main stem and major tributaries" of the Grand River (Grand River Implementation Committee, 1982:6.20). Nutrient enrichment causes algal blooms and low night-time dissolved oxygen conditions which in turn encourage the growth of aquatic plants. Dissolved oxygen problems are encountered in the Grand River below Kitchener and in the Speed River below Guelph (Grand River Conservation Authority, 1979:75; Grand River Implementation Committee, 1982:6.17,6.20). Locally important nutrient contributions occur in the upper basin (Grand River Implementation Committee, 1982:6.19). General aesthetics in these areas are also affected. Angling in the Grand River is generally not constrained by excessive nutrient or aquatic plant levels; however, aquatic plant growth does hinder angling in some areas such as from Waterloo downstream past Cambridge (Gartner Lee, 1987:iii; Grand River Conservation Authority, 1979:77).

For the total basin, rural non-point sources contribute the largest proportion of nutrient input, particularly during snow melt and storm events of the late winter-early spring period (Grand River Implementation Committee, 1982:6.19; Hore and Ostry, 1978). This is explained by the fact that phosphorus compounds cling readily to soil particles, therefore soil erosion during spring thaws or storm events is the most significant mechanism for the transport of phosphorus to watercourses (Bird, 1985; Grand River Implementation Committee, 1982:6.17). Land runoff, milkhouse wastes, cattle access to watercourses, municipal drainage, drainage from feedlots or barnyards, and malfunctioning private sewage treatment systems are the principal rural contributors of nutrients (Grand River Implementation Committee, 1982:6.17; Irwin, 1989).

In urban areas the principal sources of nitrogen and phosphorus compounds are municipal sewage treatment plants, stormwater runoff, and occasionally, during severe storm events, by-passed municipal sewage (Grand River Implementation Committee, 1982:6.17). The institution of phosphate removal in 1974 by all sewage treatment plants in the basin helped to alleviate some problems associated with point source pollution (Grand River Implementation Committee, 1982:6.17; Hore and Ostry, 1978:45). No specific treatment for nitrogen has yet evolved (Grand River Implementation Committee, 1982:6.17).

The bulk of nutrient input in the upper basin north of the city of Waterloo is from rural drainage (Grand River Implementation Committee, 1982:6.19). Although rural drainage sources contribute the largest proportion of most nutrient forms, the relative significance of sewage treatment plants increases substantially during the summer-fall period. Agriculture and private waste disposal may contribute significant amounts of nitrite plus nitrate-nitrogen to the groundwater system. Although usually localized, the number of occurrences appears to be increasing (Hore and Ostry, 1978:50).

Suspended Sediments

Although the presence of suspended sediments depends upon the soil type through which the stream flows, human activities have further degraded the quality of the water in the Grand River.

Rural sources account for more than ninety percent of the total basin loading of suspended sediments (Grand River Implementation Committee, 1982:6.21). This is due to improper tillage and various cropping patterns. Several programs are currently in effect to combat this problem, and these are discussed below. The central basin is a significant urban contributor of suspended sediments. Stormwater runoff from construction sites contributes approximately eighty percent of suspended sediments in urban areas (Grand River Implementation Committee, 1982:6.21,22).

Suspended sediments produce aesthetically unattractive water, decrease the quality of fish spawning substrate, exert a demand on water oxygen resources, or interfere with swimming (Gartner Lee, 1987:17; Grand River Implementation Committee, 1982:6.21; Hore and Ostry, 1978:50). The majority of river sediment loads (up to 80%) is transported during the months of February, March, April, and May (Hore and Ostry, 1978:vii). This is significant in light of the affinity of toxic materials for these particles and the spawning period for various fish species.

Toxic Substances

Chlorine and un-ionized free ammonia are two of the most commonly found toxic substances in the Grand River. They are present, to some extent, downstream from most conventional sewage treatment facilities in the basin. Un-ionized free ammonia concentrations also result directly from livestock operation runoff (Grand River Implementation Committee, 1982:6.24).

These substances have the potential to stress or kill fish and other aquatic life at low concentrations (Grand River Implementation Committee, 1982:6.24). Although toxic forms of chlorine are relatively short-lived in the receiving waterbodies, chlorine can severely affect the aquatic community (*ibid.*). Summer is the most critical time for the presence of un-ionized free ammonia since it is during these periods that water stratification in reservoirs along the Grand River creates levels approximating or exceeding provincial water quality objectives (*ibid.*).

Trace Contaminants

In the Grand River, domestic and industrial effluents from municipal sewage treatment plants and urban land drainage, and atmospheric fallout of pollutants such as lead from automobile exhaust, are the most significant sources of metals to streams (Grand River Implementation Committee, 1982:6.22; Hore and Ostry, 1978:50). Rural land drainage and stormwater drainage provide a less significant source. Lead, zinc, copper, and cadmium samples extracted from the Grand River near Glen Morris slightly exceed provincial water quality guidelines (Grand River Implementation Committee, 1982:6.22). This results in some restrictions for fish consumption; however, no studies exist to show if these levels significantly affect aquatic communities.

Sewage treatment plants and land drainage from urban areas are the primary contributors of industrial organic compounds to the Grand River (Grand River Implementation Committee, 1982:6.22). Although present in the Grand River, industrial organic compounds should pose no threat to aquatic life or use of the river for water supply (*ibid.*). Direct industrial discharges are few; however, those of note include Uniroyal, Stanley Works,

Rothsay Concentrates, Tend-R-Fresh, and Schneiders (Irwin, 1989). Tend-R-Fresh is no longer in operation (Irwin, 1989).

The greatest input of pesticides is from rural and urban runoff and from sewage treatment plants (Grand River Implementation Committee, 1982:6.22). Pesticide samples collected at the mouth of the Grand River indicate the presence of several pesticides; however, all are within the OMOE guidelines for aquatic biota protection (*ibid.*). Data on the presence of pesticides in the Grand River are sparse due to the high cost of testing (*ibid.*).

Flooding

Although the Grand River is naturally flood-prone, human disturbances within the watershed have aggravated this problem, as is evident in the Cambridge, Paris, and Dunnville areas. Mitchell et al. (1978:3) identify four causes of flooding. The first, climate, generally involves high spring flows usually attributed to spring runoff and ice jams (Beltaos and Wong, 1987; Grand River Implementation Committee, 1982). The silt and clay surface materials in the upper portion of the river basin encourage large volumes of runoff. In conjunction with the relatively steep river grades and shallow water depth, high river discharges are experienced here, thus inducing flooding (Grand River Implementation Committee, 1982:2.1). Low infiltration rates and flat terrain in the lower portion of the basin promote large volumes of surface runoff and poor outlet conditions, causing local flooding (*ibid.*). Flooding is most predominant in Grand Valley, West Montrose, Kitchener, Paris, Brantford, Dunnville, Eden Mills, Rockwood, and New Hamburg (Grand River Implementation Committee, 1982:6.12). Seasonal or major regional storms may also induce flooding.

Development in the form of urbanization, urban encroachment, and landscaping and land subdivision is encouraged by the presence of fertile alluvial soils, the proximity to watercourses, the generally flat terrain, and the aesthetic qualities of floodplains. Concurrent structural changes occurring in the vegetative composition of the floodplain usually result in increased flooding in downstream low-lying areas (Veale, 1979:52). This is supported by Sangvaree and Yevjevich (1977:1) who note that vegetative cover beneficially influences several components of the hydrological cycle including:

"...(1) ground shading, minimizing wind influence; (2) spreading of water flow over the land surface, thus retarding the surface runoff and increasing the infiltration; (3) developing a more porous soil texture within the root zone as the result of building up and maintaining the organic content of the soil; (4) establishing and maintaining the undecomposed or partly decomposed organic matter at or near the soil surface; and (5) increasing of storage capacity and infiltration of the soil, resulting in lesser erosion and lesser gully formation."

For a given small catchment "...the agricultural land use means a smaller flood peak with a faster surface runoff...than the predominantly forest land-use catchments" (Sangvaree and Yevjevich, 1977:1-2). This was evidenced when intensive clearing in the headwaters of the Grand River basin during the 1850s caused flooding between 1890 and the 1930s (Gartner Lee, 1987:11).

Presently, natural vegetative cover within the Grand River basin is broken and patchy, the result of a cultural or human-dominated landscape (Balsler, 1989:47). Exceptions are the Grand River Forest and a large stretch of the western bank of the Grand River from Cayuga to Dunnville. Within the next fifty years land use changes in the Grand River basin are likely to be minimal; however, it is expected that wooded areas will likely decrease (Veale, 1981:5).

Urbanization is the third cause of flooding. A greater percentage of impermeable surfaces created in response to urbanization reduce infiltration and promote runoff. A stream will leave its banks five to six times more often after complete urbanization than it did in its natural state (Veale, 1979:52). Urban encroachment on the floodplain reduces the storage space available for flood waters. This forces the river to rise and flow more rapidly (ibid.). This is evident in the Galt area where an increase in flood frequency is observed (Mitchell et al., 1978:3). Landscaping and land subdivision usually shorten the distance over which water flows before reaching a drainage way, therefore reducing the lag time between rainfall and channel run-off (Veale, 1979:52). Table 3 in *Human Adaptation to the Riverine Environment* (Skibicki and Nelson), shows mean monthly discharges for various areas within the Grand River basin. It is interesting to note that exceptionally high discharges occur in the Brantford area. However, within the Grand River basin, uncertainty exists regarding the degree to which flood frequency and magnitude are affected by these urban factors (Veale, 1979:52).

Flood control measures are often incorporated into a river regime in order to alleviate hazards such as loss of life and damage to property associated with floodplain development. However, floods are occasionally provoked by flood control measures (Welcomme, 1979:525). This is clearly illustrated by the severity of the 1974 flood which was accentuated by conflicting management objectives for the Conestogo and Shand dams (Mitchell et al., 1978:4). Flood control measures on the Grand River include reservoirs which retain large volumes of runoff for later release; levees; and channel rectification or enlargement. The extent to which these factors help or hinder the problems associated with flooding varies with respect to location and storm magnitude.

On the Grand River most large dams are under GRCA authority. Map 1 in *Human Adaptation to the Riverine Environment* (Skibicki and Nelson), illustrates the control structures within the Grand River Valley. The Grand River Implementation Committee (1982:6.12) observed that the construction of the Shand, Conestogo, and Guelph dams has reduced flood peaks and that average annual flood damages are reduced by sixty-three percent as compared with those which would occur under natural conditions. However, although increases in flood peaks over the past sixty-five years have been partially offset by the flood control capabilities of the existing reservoir system, further increases are expected if changes in land use patterns continue (Grand River Implementation Committee, 1982:6.14).

Levees heighten the natural streambank upward to prevent water from spreading laterally onto the floodplain (Welcomme, 1979:252). Although the areas behind them are protected from flood waters, the occasional breaching of these structures by floods may cause problems as water becomes trapped behind them without a means of escape. Levees have been constructed in Brantford, Paris, Galt, and Bridgeport (Mitchell et al., 1978:62).

Finally, channelization, the smoothing and straightening of stream banks, reduces the time lag between rainfall and channel runoff, thereby increasing the propensity for flooding downstream. The narrowing of the Galt channel for erosion protection effectively illustrates this problem. Channelization may also be implemented when attempts are made to increase the navigational use of a river. This is illustrated in the lower portion of the Grand River where the remains of an old lock system are still evident.

Flooding does not appear significantly to affect recreational activities in the Grand River. Indirectly, however, the presence of structural controls may have a negative impact on biotic life.

Reservoir water storage, although effective in reducing flood peaks during storm events below a dam, may accumulate sediments carried by streams (Kozlowski, 1984:3; Welcomme, 1979:247) affecting fish species. This does not appear to be a problem in the reservoirs located

along the Grand River since they are drawdown reservoirs. A study conducted by the GRCA revealed no accumulation of sediments in local reservoirs (Mason, 1989). Also, fish reproduction in flood pools along the river margins is eliminated; this is noticeable upstream in the Grand River (Gartner Lee, 1987:11). However, reservoirs themselves may support larger fish populations than floodplain reaches, this being dependent upon the physical characteristics of the reservoir (Welcomme, 1979:250). This trait is not likely to occur in reservoirs on the Grand River since the reservoirs act primarily as flood control devices. Drainage of these reservoirs during the winter is not conducive to large fish populations (Mason, 1989).

Water impoundment results in the flooding of land in order to protect other land. This impoundment often creates adverse sites for upland plants. On the other hand, recreational areas and wildfowl habitat are created as a result of this form of engineering (Kozlowski, 1984:3). Examples of this in the Grand River basin include Luther Marsh, Lake Belwood, Conestogo Lake and Guelph Lake.

The primary constraint imposed by levees is that of denying fish access to necessary feeding and breeding grounds (Welcomme, 1979:252; Gartner Lee, 1987:11). Fish catch and diversity tend to drop, and fish are less protected from increased flow during floods. This is true of the levees constructed along the Grand River; however, measures are currently being taken by the GRCA to incorporate habitat improvements with levee construction (Mason, 1989). Also, the potential for sediment and pollution concentration is increased (Welcomme, 1979:253).

Low Flow

Water quantity is dependent upon climatic factors (droughts) and human intervention. Low flow augmentation is implemented to offset problems associated with low water flow. Periods of low water may coincide with water extraction processes. Water withdrawal from large municipal wells has the potential to lower surface water in nearby streams. This is most common in the vicinity of Kitchener-Waterloo, Cambridge, and Guelph (Grand River Implementation Committee, 1982). Winter drawdown produces less than optimal fish production (Gartner Lee, 1987:ii). This is true of most reservoirs in the Grand River basin. However, the GRCA is currently examining ways of modifying fish production in these reservoirs by introducing a winter holding level (Mason, 1989). This is being examined at Guelph Lake.

Low water conditions also encourage water quality degradation since less water is available for dilution of pollutants and contaminants. This is especially true in Fergus although potential exists for this to occur in other areas along the Grand River (Grand River Implementation Committee, 1982).

PLANNING

Management concerns related to both water quality and water quantity include the constraints presently imposed upon the system and possible future stresses caused by population growth and associated demands. Both the continuation of current management measures and the implementation of new measures are necessary to maintain the Grand River as a Canadian Heritage River.

Current Management Measures

Due to the ubiquitous nature of water, its mobility, and its function as a medium and mode of transport, the implementation of planning strategies may be achieved only through cohesive, integrated, basin-wide co-operation. Greater co-operation between existing agencies and/or the formation of a new agency(ies) specifically to handle heritage planning of the Grand River are means of attaining this end. Current inter-agency co-operation is improving, as indicated by joint studies conducted by the GRCA, OMAF, and the local health units; increased liaison between the OMOE and the OMNR; and formation of the Grand River Technical Co-ordinating Group (Irwin, 1989). Also, the OMOE is presently taking a tougher enforcement role with respect to water quality. This includes tighter Certificates of Approval, and better use of the reasonable use concept policy, the *Environmental Assessment Act*, and the Investigations and Enforcement Branch (IEB) of the OMOE.

"Based on the Grand River watershed information, the most cost-effective remedial measures to moderate non-point sources of pollution...will be those that control pollutant runoff from agricultural and urban areas" (Hore and Ostry, 1978:viii). Currently, measures undertaken to achieve this goal include the Municipal Industrial Strategy for Abatement (MISA), Soil and Water Environmental Enhancement Program (SWEEP), Ontario Soil Conservation and Environmental Protection Assistance Program (OSCEPAP), Clean Up Rural Beaches (CURB), Land Stewardship Program, and local and provincial steering committees (Appendix C). A sport fish contaminant program is also underway (Irwin, 1989).

With respect to water quantity, The Water Network is currently conducting research on climate change within the Grand River Basin (Sanderson, 1989).

Future Management Measures

As suggested by Smith (1989:73), future management objectives could include "...zoning for types of industrial and other development according to criteria and effects on important natural and human heritage features as well as recreation and tourism areas." Also, better application of current legislation such as floodplain zoning could possibly be examined.

The monitoring of both water quality and water quantity and the various measures taken to manage them is essential in ensuring their effectiveness.

Recent guidelines prepared by the Canadian Council of Resource and Environment Ministers (CCREM) state that parameters for monitoring Canadian Heritage River integrity are to be selected:

"...on the basis of perceived water quality problems and threats to the heritage and recreational resources and integrity values for which each river was nominated." (CCREM, 1987:2)

Suggested parameters for monitoring water quality in the Grand River are listed in Table 2. They may be subject to revision with further review. These parameters were chosen by the author based on the perceived water quality problems of the Grand River, the water quality parameters currently tested for by the GRCA, and the Canadian Heritage River integrity guidelines established in Section 5.3 of the CCREM *Canadian Water Quality Guidelines* (Appendix A).

The new water quality guidelines established by the CCREM determine the parameters to be monitored and the monitoring procedures to be implemented upon designation of the Grand as a Canadian Heritage River. It appears that the number of water quality parameters will be greater than in the past, and will more accurately monitor those problems which threaten the status of the river.

The formation of a committee specifically to ensure the effective continuance and monitoring of heritage and recreation uses within the basin is a feasible concept. Due to the importance of water in the Canadian Heritage Rivers System, the monitoring of water quality and quantity for heritage and recreational purposes should be the first goal. This could be accomplished through such means as Geographic Information Systems (GIS) and the inclusion of biannual water reports as part of a State of Heritage report. The incorporation of data regarding the monitoring of water quality as established by the CCREM could be included in this report.

APPENDIX A

Integrity Guidelines for Canadian Heritage Rivers

Procedures for Monitoring the Status of Canadian Heritage Rivers

In order to ensure that all Canadian Heritage Rivers continue to possess the outstanding heritage values for which they were originally designated and thus continue to merit this designation, the Board will periodically review the status of rivers within the System. This monitoring will take place in the following manner:

- a) Yearly monitoring of Canadian Heritage Rivers will take place by the managing jurisdiction and the Board through the production and review of annual report submissions;
- b) The Board will review each designation at least every ten years, in conjunction with the responsible agency, if at all possible, but having the capacity to undertake an independent assessment if deemed necessary;
- c) The Board Chairperson, at the direction of the Board, will convey any concerns regarding loss of Canadian Heritage River values to the Minister responsible for the Canadian Parks Service and the appropriate minister(s) of the managing jurisdiction(s).

Source: *The Canadian Heritage Rivers System: Objectives, Principles and Procedures*. Parks Canada, 1984. Appendix I, Section B, p.21.

Information Requirements for River Integrity

Monitoring of the integrity of designated rivers will require that information is collected on the condition of key elements and ecosystem components which are not included among the rivers' heritage and recreational resources.

In monitoring the integrity of designated rivers, particular attention will be paid to their water quality. At the time of designation, two schedules of water quality parameters will be drawn up for each river. One schedule will list those parameters which require measuring annually, and the other will list parameters requiring less frequent measurement. Parameters and associated guidelines on permissible levels included in these schedules will be selected from the *Canadian Water Quality Guidelines* of the Canadian Council of Resource and Environment Ministers. Parameters will be selected on the basis of perceived water quality problems and threats to the heritage and recreational resources and integrity values for which each river was nominated. The schedules will be subject to the Board's approval.

Source: *Canadian Water Quality Guidelines*. Canadian Council of Resource and Environment Ministers, 1987. Section 5.3, p.2.

APPENDIX B

Pesticides Tested for at the Bridge in Dunnville

Arsenic	Ethion
Cobalt	Guthion
Mercury	Leptphos
Manganese	Malthion
Alachlor	Phoslone
Metalachlor	Parthion
Aldrin	Phosmet
BHC Alpha	Carbofuran
BHC Beta	Carbaryl
BHC Gamma	Cycloate
Chlordane Alpha	Eptam
Chlordane Gamma	Molinate
Dieldrin	Pebulate
DMDT Methyllr	Sutan
Endrin	Vernlate
Endosulp sulphate	Hxchloro Butadine
Mirex	HCB
Oxchlane	HCE
OP-DDT	Octchlor Styrene
PCB	Pentachlorobenzene
PP-DDD	2,3,6-Trchlorotoluene
PP-DDE	2,4,5 "
PP-DDT	2,6,4-"
Atrazine	1,2,3-Trchlorobenzene
Cyazine	1,2,4-"
Cyprazin	1,3,5-"
DE-Etylt Atrazine	1,2,3,4-Techlorobenzene
Prometon	1,2,3,5-"
Sencor	1,2,4,5-"
Simazine	
Dicamba	
MCPA	
MCPB	
MCPP	
Silvex	
2,4-D	
2,4-DB	
2,4-CP	
2,4,5-T	
Chloro Fenvin Phos	
Demeton	
Diazinon	
Dimethok	
Dursban	

Source: Grand River Conservation Authority, 1988.

APPENDIX C

Measures to Assist in Moderating Non-Point Sources of Pollution

Clean Up Rural Beaches

Clean up rural beaches (CURB) is a remedial action plan undertaken by the OMOE to "...reduce water pollution from livestock manure in the watersheds of the Upper Nith, Speed and Conestogo Rivers" (OMAF and GRCA, 1989:15). It was initiated in 1986. During 1988 an extensive public education program was implemented and two demonstration farms were developed to illustrate methods of reducing water quality degradation (OMAF and GRCA, 1989:17).

Environmental Assessment Act

Currently, a greater number of individuals are falling under the Environmental Assessment Act (Irwin, 1989), thereby increasing its usefulness as an environmental mediator.

Investigations and Enforcement Branch

The Investigations and Enforcement Branch of the OMOE, under Legislation 67 of the Ontario Water Resources Act, has increased the number of fines given during the last four years for individuals breaching the regulations. Also, the number of staff in this area has increased (Irwin, 1989).

Land Stewardship Program

The Land Stewardship Program (LSP) is a three-year program initiated in 1987. Its purpose is to provide grants for the adoption of conservation farming practices that will enhance and sustain agricultural production and improve soil resources and water management by: reducing soil erosion and soil compaction; restoring soil organic matter and structure; and minimizing potential for environmental contamination from agricultural practices (OMAF, 1988:1).

The four components of the LSP are: financial assistance; research; education and extension; and program delivery and service (ibid.).

Municipal Industrial Strategy for Abatement

The ultimate goal of the Municipal Industrial Strategy for Abatement (MISA) is "...the virtual elimination of toxic contaminants in municipal and industrial discharges into waterways" (OMOE, 1986:7). The identification and measurement of toxic discharges, emphasis on control technology, strengthening and expansion of the existing water quality impact approach and strengthening of enforcement mechanisms, and the involvement of municipalities, industries, general public and interest groups are all measures intended to achieve this goal (OMOE, 1986:7-8).

Ontario Soil Conservation and Environmental Protection Assistance Program II

The Ontario Soil Conservation and Environmental Protection Assistance Program II (OSCEPAP II) was a joint federal/provincial effort to "provide grant assistance for controlling agricultural soil erosion, sustaining crop productivity and protecting water resources" (OMAF, 1987:1). The main focus of this program was on soil erosion control and manure storage. OSCEPAP II has currently expired (Mailloux, 1989).

Reasonable Use Concept Policy

The reasonable use concept policy is an OMOE policy directed at permitting allowable amounts of water quality degradation. It also applies principles of fair sharing (Irwin, 1989).

Soil and Water Environmental Enhancement Program

The Soil and Water Environmental Enhancement Program (SWEEP) is a "...5-year, \$30-million, federal/provincial agreement to improve soil and water quality in Southwestern Ontario" (Agriculture Canada and OMAF, 1989:15). The major purpose of this program is to "...reduce phosphorus loading into the Lake Erie basin from cropland runoff and to reduce soil degradation that seriously affects the area" (ibid.). Representatives are selected from Agriculture Canada, OMAF, the farm community, agri-business and the University of Guelph (Agriculture Canada and OMAF, 1989:1).

Tillage 2000

Tillage 2000 is sponsored by OMAF, by the Department of Land Resource Science at the University of Guelph, and by the Ontario Soil and Crop Improvement Association. It is a "long-term, on-farm, field-scale research/demonstration project" initiated in 1985 (Agriculture Canada and OMAF, 1989:10). Its principal objective is to "...develop and evaluate conservation farming systems for specific soil types which maximize economic productivity and minimize soil degradation" (ibid.).

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TABLE 1

**Water Quality Parameters Measured by
The Grand River Conservation Authority**

Parameters	Location				
	1	2	3	4	5
Alkalinity	x	x	x		x
Aluminium		x	x		x
BOD	x	x	x		
Calcium			x		x
Cadmium			x		x
Chemical Oxygen		x	x		
Chemical Oxygen Demand		x	x	x	
Chloride	x	x	x	x	x
Chromium			x		x
Coliform (total)	x	x	x	x	
Conductivity	x	x	x	x	x
Copper	x	x	x		x
Dissolved Organic Carbon	x	x	x	x	x
Dissolved Oxygen	x	x	x	x	x
Fecal Coliform	x	x	x	x	x
Fecal Strepcus	x	x	x	x	x
Iron			x		
Lead	x	x	x		x
Magnesium			x		
Nickel			x		
NH ₃ -N	x	x	x	x	x
NO ₂ +NO ₃ N	x	x	x	x	x
NO ₂ -N	x	x	x	x	x
K'dahl N	x	x	x	x	x
Pesticides *					x
pH	x	x	x	x	x
Phenols	x	x	x	x	x
PO ₄	x	x	x	x	x
Phosphorus	x	x	x	x	x
Residue Filtered	x	x	x	x	
Residue Particulate	x	x	x	x	
Sulphate			x		
Turbidity	x	x	x	x	
Zinc	x	x	x		x

- 1 - East Luther and Amaranth Township Line
- 2 - Blair Bridge
- 3 - Glen Morris Bridge
- 4 - At Cocksutts Bridge Above Brantford
- 5 - At Bridge in Dunnville

* See Appendix B

TABLE 2

**Suggested Parameters for Assessing Water Quality
in the Grand River****SCHEDULE ONE****Recreation**Physical Parameters

Aesthetics
Aquatic Plants
Odour
Total Suspended Solids

Microbiological Parameters

Enterococci/Coliforms
Parasites
Pathogens

Inorganic Parameters

pH

Freshwater Aquatic LifeOrganic Parameters

DDT
Toxaphene

Physical Parameters

Total suspended solids
Turbidity

Inorganic Parameters

Mercury

SCHEDULE TWO

Recreation

Physical Parameters

Oil and Grease

Odour

Turbidity

Clarity

Colour

Freshwater Aquatic Life

Physical Parameters

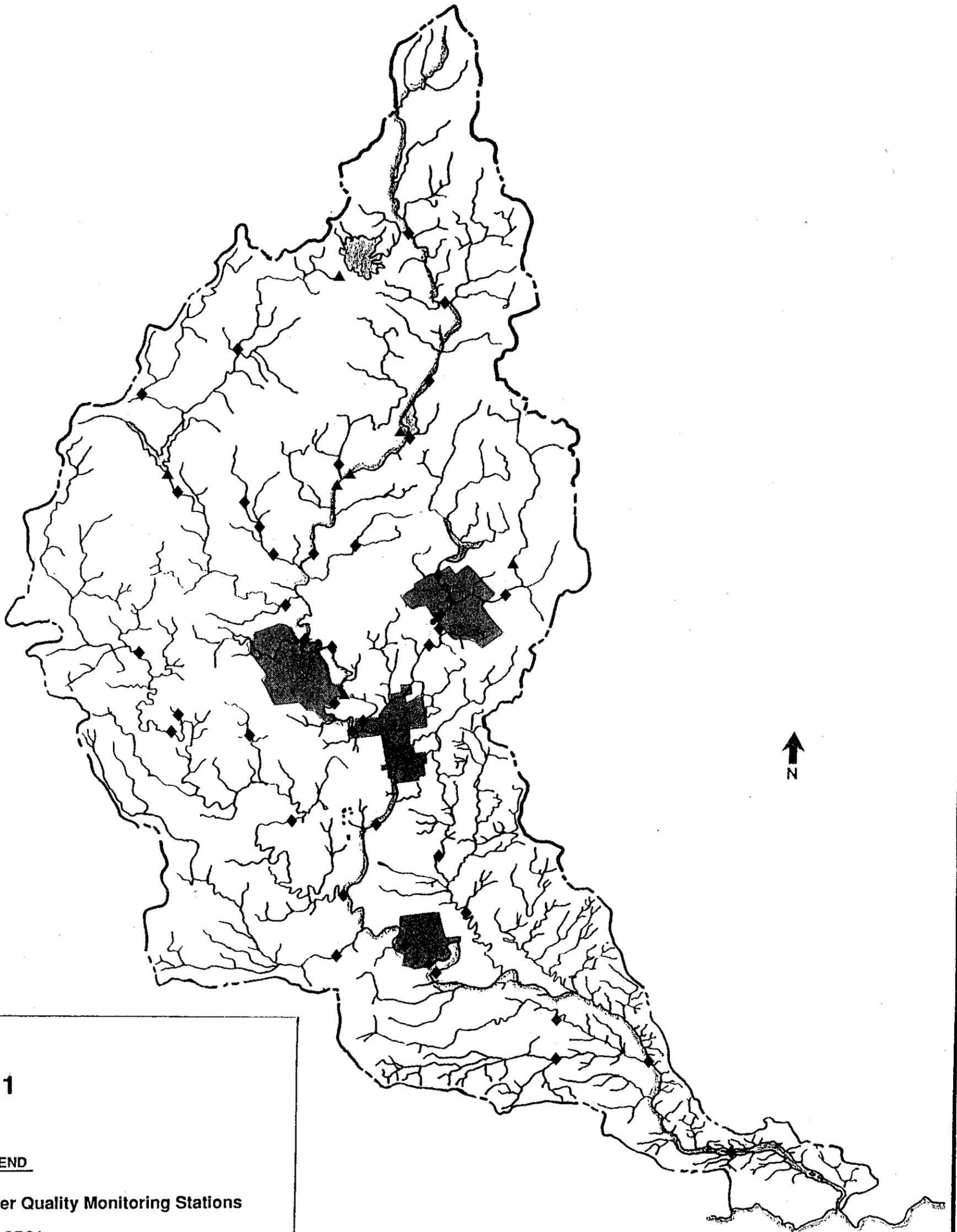
Turbidity

Inorganic Parameters

Lead

Derived from Canadian Council of Resource and Environment Ministers (CCREM). 1987. *Canadian Water Quality Guidelines*. (Chapters 2 and 3). Prepared by the Task Force on Water Quality Guidelines.

THE GRAND RIVER VALLEY



Map 1

LEGEND

Water Quality Monitoring Stations

- ◆ GRCA
- OMOH
- ▲ OMOE



Natural Heritage Challenges at the Local Level: The Grand River Forest, Ontario

David A. Balser and J.G. Nelson

CONTEXT

The Grand River watershed, Ontario, is like many other areas in southern and eastern Canada and the northeastern United States in that most of the land is given over to agricultural and urban uses. The natural areas which remain require some form of protection from the continuing stresses which agricultural intensification, urbanization, and industrial development place on them. If there is to be a place for the enjoyment of nature in human society a century from now, the gradual erosion of natural areas must be controlled or halted, and in some places, reversed. Many recreation opportunities depend on the existence of areas in a more or less natural state, but this type of use does not generate much in the way of profits. Therefore, there is a built-in economic incentive in many cases to clear forests, drain swamps, and fill marshes for agriculture, residential development, or other more financially rewarding activities. In a watershed where most land is privately owned, and where land values are high, the challenge for conservation organizations in particular is to find a means of protecting natural areas without the need for a massive program of land acquisition, or implementing regulations which can be perceived as unfair to landowners.

Although many institutional arrangements have been developed to assist with natural area protection and management (see Table 1), the principal responses over the last 15 years have been to develop a system of designating the most significant areas under one or more programs designed to encourage conservation, and to buy a minority of areas to help satisfy the public demand for open space (Hilts et al., 1986). Examples of these two approaches can be seen in the Regional Municipality of Waterloo's designation of Environmentally Sensitive Policy Areas (ESPAs) (Francis, 1977), and the Grand River Conservation Authority's (GRCA) acquisition of Conservation Areas. In recent years, the province has become more involved in natural area protection through the Ministry of Natural Resources' (OMNR) Areas of Natural and Scientific Interest (ANSI) program (Ontario Ministry of Natural Resources, 1987); OMNR's Wetlands program (Glooschenko et al., 1988); and the Natural Heritage League's Carolinian Canada program (Eagles and Beechey, 1985) and Private Stewardship program (Hilts, 1988). Last year the province also passed the *Conservation Lands Act*, which allows for property tax rebates of up to 100% for landowners of provincially significant ANSIs or wetlands in return for an agreement to provide long term stewardship (OMNR and Ontario Ministry of Municipal Affairs (OMMA), 1989).

With the foregoing and other programs in place, one might be forgiven for concluding that all that could reasonably be done to preserve natural areas is being done by the three levels of government. Unfortunately, such is not the case (Swaigen, 1979; Barrett and Riley, 1980). Many shortcomings are to be found in these programs, perhaps the most significant being that they are unco-ordinated. ESA designations follow one set of criteria, ANSIs another, and wetlands another still. Instead of complementarity, there is often considerable overlap. In

addition, most programs concentrate on only the most significant areas, with little attention being paid to the "run-of-the-mill" natural areas which provide so many essential ecological functions, such as affording habitat for wildlife or controlling surface runoff. The challenge for conservation agencies is to co-ordinate their efforts better, and to develop landscape-based approaches to conservation which can maintain the ecological integrity of much of the entire watershed.

PATTERNS

Settlement of the watershed has produced a pattern of land clearance influenced by topography, the dictates of crown survey, and other factors. The result is a patchy distribution of natural areas, sometimes linear, sometimes clumped or aggregated. These patterns present special problems and opportunities in heritage planning and management. According to the 1988-89 Grand River heritage inventory (Nelson and O'Neill, 1989), this is especially true in the three major natural areas in the watershed: Luther Marsh, the Grand River Forest, and the Dunnville wetlands (Map 1). These outstanding landscapes each cover tens of square kilometres, and include an array of smaller-scale natural and human heritage resources.

Luther Marsh is a very large wetland-forest complex which exists in relative isolation on a generally flat ground moraine traversed by several eskers. It is surrounded by low-intensity agriculture. Within the complex are a great variety of habitats, including a 4000-hectare marsh and open water area, a 500-hectare acidic fen, and various upland and lowland forest types (Ecologistics Ltd., 1982).

The Grand River Forest is the central spine of a highly varied landscape, sometimes termed the Dumfries landscape complex (Map 2). The Forest runs along the river for 20 km from Cambridge to Paris in an almost unbroken strip. The area contains many different natural habitats, and is relatively heterogeneous due to its hummocky glacial topography and other influences. Most of the Grand River Forest is privately owned, with some residential development on the east and west banks near Cambridge, north of Paris, and at Glen Morris.

The presence of the Galt and Paris moraines has resulted in strongly varied topography which has preserved many small natural areas. There is an unparalleled variety of community types in the area, including upland maple-beech stands on cooler sites, oak-hickory on warmer, drier sites (including some remnant oak savannah), swamp forest, bogs in kettle depressions, and even some patches of remnant tall-grass prairie (Hannah, 1984). Some sites such as the Pinehurst Lake area and the southern stretch of the Grand River Forest have a Carolinian affinity, i.e. they contain species which are characteristic of the deciduous forest zone found in the eastern United States and the southernmost part of Ontario (Rowe, 1972). Significant natural areas have been designated as ANSIs, Carolinian Canada sites, significant wetlands, ESPAs, hazard lands, and GRCA regulated areas (Maps 2 and 3).

The Grand River marshes at Dunnville are a string of wetlands in the river itself and on the banks, stretching for about 10 km, primarily on the west side. Although the level of the river was raised by the weir at Dunnville in 1831, and the original marshes were flooded, extensive new marshes have developed which strongly resemble the less disturbed wetlands below the weir extending to Lake Erie.

SIGNIFICANCE

Many significant natural areas have been identified in the valley and in the three major nodes or landscapes: Luther, Grand River Forest, and Dunnville wetlands (Nelson and O'Neill, 1989).

Although all of these areas require more research in order to understand the significance of the ecological functions they perform, they can be ranked according to the diversity of species and habitats they contain. The Grand River Forest (Dumfries landscape complex) is undoubtedly the most diverse area. From Maps 2 and 3, showing significant natural areas in this node, one can see the high concentration of natural areas which have been officially designated under one or more management programs. Luther Marsh ranks a close second in terms of diversity. It actually supports more breeding birds than any other area in the watershed but, because it lacks the Carolinian flora, would rank lower overall. Finally, the Dunnville marshes are impressive mainly for their size and lack of disturbance, even though they form a relatively homogeneous community.

CONSTRAINTS

Natural areas are subject to a number of stresses. Some stresses are a result of the fragmentation of the original forest cover (Freemark, 1988), while others are a consequence of land use or land management practices (Simpson-Lewis et al., 1983). The most serious threat is habitat destruction, due to either urban or agricultural expansion. The vast majority of natural areas in the watershed are on private land. As cities expand and farmers are caught in a continuing financial squeeze, the threat of converting many natural areas to more "productive" uses is always present. Sometimes the land has a high resource value, as in the case of mineral aggregates. Often losses occur in the form of apparently insignificant incremental "nibbles"; indeed areas can be damaged or lost without the knowledge of concerned persons or agencies.

Other types of stresses result from the "island effect": the tendency for areas to lose species as an inverse function of area. An isolated fragment of forest contains fewer species at equilibrium than an area of equal size which is part of a contiguous forest (Diamond and May, 1976). Thus there is always a certain amount of unpredictability in assessing which species and populations will endure (Menges, 1986; Soulé and Simberloff, 1986). The antidote to this condition is greater linkage or connectivity among areas. A host of problems arise in bringing this about, not the least of which has been the failure on the part of conservation organizations to recognize the importance of corridors (Noss, 1987), although this may be changing (Adams and Dove, 1989). The main Grand River valley and adjoining stream valleys present one possible solution, acting as natural corridors whose use and development is already regulated by the flood and fill regulations of the GRCA.

The problem of preserving and effectively managing individual areas is made even more acute when whole landscapes are considered. To date the emphasis has been on the content of relatively small areas deemed significant by one program or other, rather than their overall landscape context. How to conserve natural character and diversity at the landscape scale has scarcely been addressed (Noss and Harris, 1986). Similarly, the institutional arrangements for addressing environmental quality concerns related to land management practices, such as agriculture, are few, and those that do exist are overwhelmed. Thus the potential for such important concerns as stream rehabilitation and the impact of forestry on wildlife are largely unrealized.

Not only are the budgets of conservation organizations inadequate to manage and conserve resources properly, but options are limited due to the high cost of land. The traditional approach of simply buying land in the public interest is of limited utility. This has necessitated a recent reliance, through landowner contact programs, on persuasive techniques such as private stewardship, but other devices need to be examined and added to the list of institutional means of conserving natural values.

PLANNING

The Existing Situation

Although there are a number of heritage conservation programs at the provincial, regional, and local levels, each program is oriented toward protection of various types of significant natural areas. In a cultural landscape, however, significant natural areas are only one component of the fabric of the landscape, in addition to natural areas which do not meet institutional criteria for significance, plus urban and agro-ecosystems. Currently, no agency has the mandate or mission to address landscape-level conservation concerns beyond the narrow boundaries of their established programs. The consequence of this situation is that we may win the battle to preserve some significant natural areas in the short term but, if the fabric of the landscape in which they are imbedded deteriorates, then the war is lost.

Critique

The case of the Grand River Forest best illustrates this concern. At the provincial level, the ANSI and Wetland programs each have specific criteria for designation. Landowners of provincially significant areas are thus entitled to a property tax rebate, although criteria are stringent and delineations must be defensible and precise. The tax rebate is a good incentive not to develop a significant natural area in the Grand River Forest, but it is not an absolute assurance. For areas not considered provincially significant, private stewardship is the only means currently available for promoting conservation on private land. Carolinian Canada has access to funds for acquisition, but is not planning to do any in this area (W. MacMillan, GRCA, pers. comm.), and is relying instead on private stewardship.

The Regional Municipality of Waterloo and Brant County both have responsibilities for natural resource protection in the Grand River Forest at the senior municipal level. However, the programs developed in the various jurisdictions often differ considerably. Waterloo Region has designated Environmentally Sensitive Policy Areas (ESPAs) in its Official Plan, which require that an environmental impact statement be filed before any development can occur. Although significant areas had been identified by researchers in Brant County, the County has not recognized such areas in any official policy, although certain lands have been zoned as hazard land or open space. The GRCA regulates wetland areas and watercourses, but has no jurisdiction over upland areas.

This assemblage of programs has protected many significant natural areas in the Grand River Forest, but many problems remain. No conservation strategy exists for the area. There is no umbrella organization which monitors potential land use conflicts, and co-ordinates the actions of responsible agencies. In some cases, boundary lines for natural area designation are piled four deep (ANSI, wetland, ESA, regulated area) without any attempt to reconcile them. Other areas fall through the cracks. Overall environmental quality, connectivity, and ecological rehabilitation are outside the mandate of any agency. Co-ordination among agencies is haphazard.

Potential Mechanisms for Natural Heritage Conservation

Ontario has little experience with planning and managing special landscapes with the exception of the Niagara Escarpment. The model adopted there (legislated mandate, zoning, development control, acquisition) represents one extreme of the regulatory continuum. Doing nothing is at the other end. In between, however, are a number of formal and informal

mechanisms which could be used to promote better stewardship of the landscape in such areas as the Grand River Forest.

1. **Co-ordinating committees:** an inter-agency committee with public representation could be established for each landscape unit (or collectively for the watershed as a whole), to prepare longer-term conservation strategies, monitor potential conflicts, and co-ordinate existing efforts. This could be done without any change in formal institutional arrangements.
2. **Special landscape designation:** other countries, notably Great Britain, designate special landscapes as Areas of Outstanding Natural Beauty even though they contain villages, agriculture, and other human features. Such designation allows for official interest in an area across jurisdictional lines, but does not confer overwhelming or special powers on any agency (Jones, 1987).
3. **Man and the Biosphere Reserve:** UNESCO's MAB program has designated Long Point on the north shore of Lake Erie as a Biosphere Reserve, and the Niagara Escarpment is in the process of being designated. A precedent exists in the USA and elsewhere for cluster biosphere reserves, a mechanism which could apply to the Grand River Forest area. Biosphere reserves rely on a combination of existing programs and broad co-operation among stakeholders for their effectiveness (Francis, 1985).
4. **Nature trusts:** there is increasing interest in Ontario in establishing a provincial level nature trust which would co-ordinate and support the activities of local or regional chapters. A trust would raise funds, acquire interests in properties, promote conservation of rural landscapes, and act as an advocate for sustainable development. Trusts could also be created at the Grand River Forest or other comparable levels by the people of the region in co-operation with agencies such as the GRCA.
5. **More formal agency co-ordination:** as part of its resource management planning for the entire watershed, the GRCA could be considered the "lead agency" for the Grand River Forest or other special areas or corridors associated with Canadian Heritage River designation (Parks Canada, 1984), or for natural heritage planning generally. Its role would be primarily to co-ordinate the activities of agencies involved in the area, conduct research, and propose planning and management options. A co-ordinating committee could be established for the Grand River Forest, including representation from the major agencies and interest groups, although such a committee could also operate at the river or basin level instead. Various arrangements for inter-agency and inter-group co-operation in such committees exist elsewhere, for example "floating chairmanship", depending on the issue and members' responsibilities.
6. **A citizens' forum:** one means of raising awareness of heritage issues among residents of the watershed would be to create an annual or semi-annual citizens' forum, responsible for monitoring and for holding public meetings like those convened in conjunction with the study of the Grand for Canadian Heritage River status (Nelson and O'Neill, 1989). Current issues could be presented, then debated by the assembly, leading to consideration of proposed solutions and a possible consensus.

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TABLE 1

**Major Agencies and Institutional Arrangements for Natural Area
Protection in the Grand River Basin***

Federal:

<i>Canadian Heritage Rivers Board</i>	Heritage Rivers System
<i>Department of Fisheries and Oceans</i>	Fisheries Act (1970)
<i>Environment Canada</i>	Canadian Wildlife Service

Provincial:

<i>Ontario Ministry of the Environment</i>	Environmental Protection Act Ontario Water Resources Act
<i>Ontario Ministry of Natural Resources</i>	Ministry of Natural Resources Act Provincial Parks Act Game and Fish Act Conservation Lands Act Forestry Act Woodlands Improvement Act ANSI Planning and Management Guidelines District Land Use Guidelines Wetlands Policy Statement (Draft) Floodplain Planning Policy Statement
<i>Ontario Ministry of Agriculture and Food</i>	Ministry of Agriculture and Food Act Agricultural Rehabilitation and Development Act Foodland Preservation Policy Statement (Draft)
<i>Ontario Ministry of Culture and Communications</i>	Ontario Heritage Act Ontario Heritage Foundation

* Many of these arrangements also relate to recreation.

Regional:*Grand River Conservation Authority*

Conservation Authorities Act
 GRCA Interim Resource Management Plan
 Fill, Construction, and Alteration to
 Waterways Regulations and Guidelines
 and Procedures

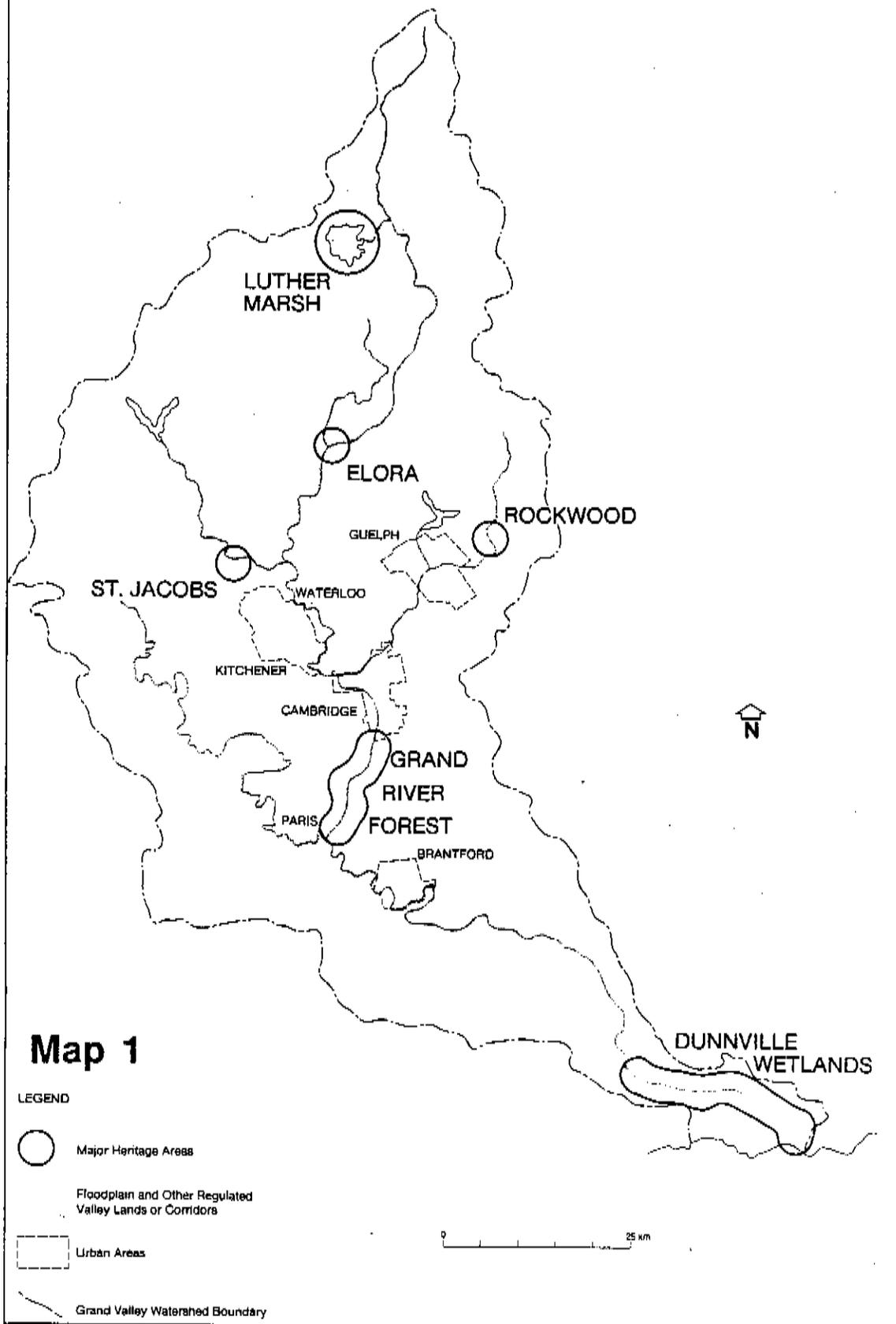
*Municipal, County, and Regional
Governments*

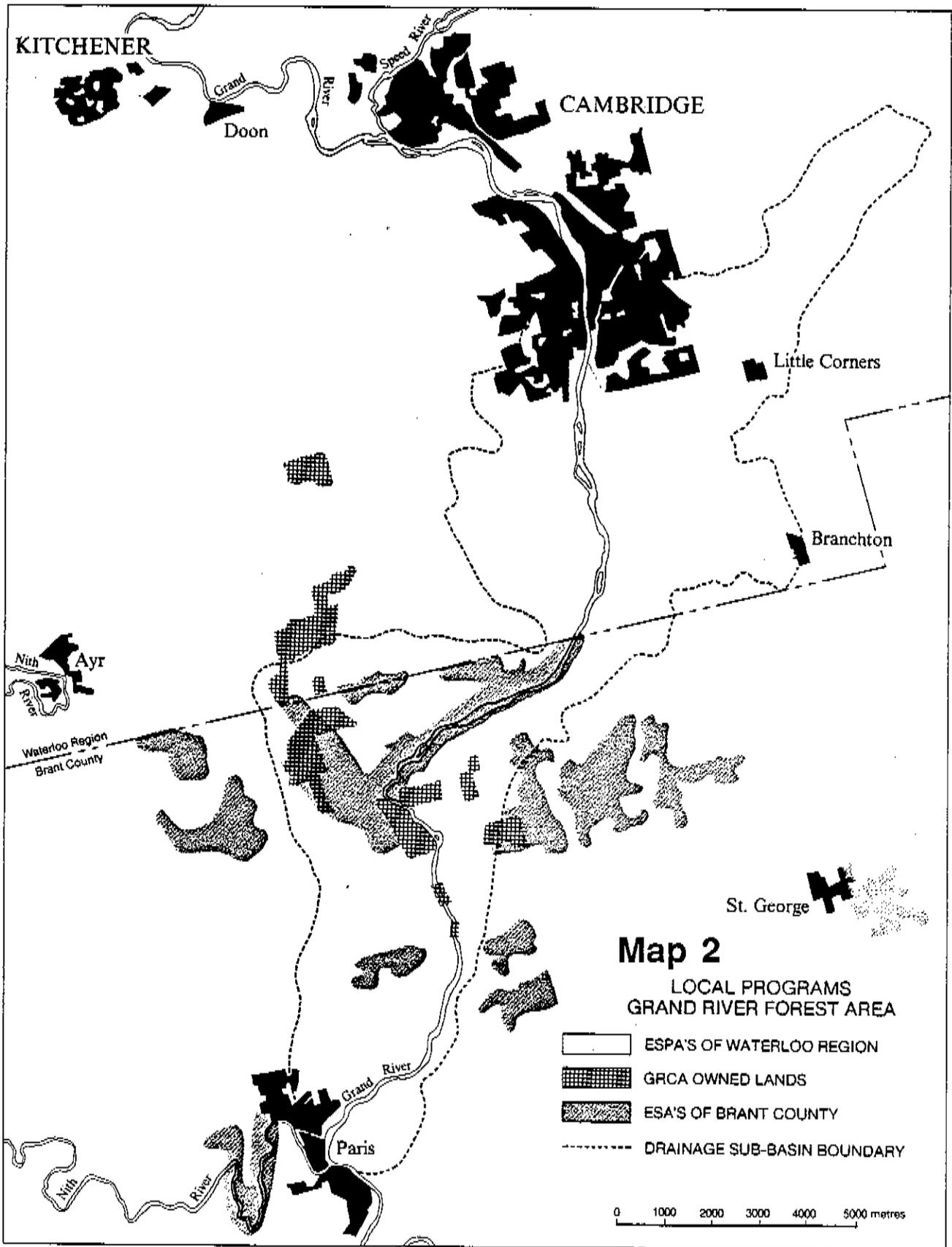
The Municipal Act
 The Planning Act
 The Trees Act

Non-Government Organizations:

Canadian Water Resources Association
 Ducks Unlimited (Canada)
 Federation of Ontario Naturalists
 Field Botanists of Ontario
 Grand Valley Conservation Foundation
 Grand Valley Trails Association
 Guelph Field Naturalists
 Hamilton Naturalists Club
 Heritage Resources Centre, University of Waterloo
 Kitchener-Waterloo Field Naturalists
 Nature Conservancy of Canada
 Norfolk Field Naturalists
 Ontario Federation of Anglers and Hunters
 Soil and Water Conservation Society (Ontario Chapter)
 Water Network, University of Waterloo
 Wildlife Habitat Canada
 World Wildlife Fund (Canada)

SCHEMATIC OF OUTSTANDING HERITAGE AREAS AND CORRIDORS





Natural Area Protection: A Case Study of Waterloo Region and Brant County

Lynda Steinacker

INTRODUCTION

The protection of natural areas is an issue of growing concern (Environment Canada, 1986:253-263). Ever-growing populations within the Grand River basin are placing greater pressure on woodlots, forests, and remnant grasslands as new subdivisions and industrial areas are created. Development also changes drainage patterns, placing extra stress on the aquifers which supply water for many people.

The aggregate demand increases as development continues. Special geological features such as kames and eskers are quite common, for example in the Cambridge-Paris area. They provide excellent supplies of aggregate for the increasing demands of development. However, many of the area's valuable natural heritage sites are associated with these landforms, and can be destroyed when aggregate mining occurs (Nelson and O'Neill, 1989:22).

Agricultural practices also stress natural areas. Farms are slowly eating into woodlots and forests, and draining wetlands to increase amounts of agriculturally productive land. Poor farming techniques increase erosion on stream banks and unstable slopes. Non-point source runoff, containing fertilizers, pesticides, and other hazardous substances, drains into the Grand.

Purpose

Various agencies have developed programs in respect to these issues. It is the purpose of this paper to identify the major natural area protection agencies and initiatives within the Grand River basin and to make recommendations regarding the creation of an effective co-ordinated natural area management strategy.

Focus

Particular attention is paid, wherever possible in examples and discussion, to the Cambridge-Paris area which lies partly in the Regional Municipality of Waterloo (RMW) and partly in Brant County. The Cambridge-Paris area acts as a case study for the examination of the existing system (Map 1 and 2). This area's boundaries include a 'node' or region of particular human, natural and recreational value as established by the Grand River Heritage Study. The

This report is a modified version of a Senior Honours B.E.S. thesis in Environment and Resource Studies, 1989.

area is important for several natural heritage features. The Grand River Forest, with its rare Carolinian plant and animal species, runs uninterrupted for approximately 20 kilometres between Cambridge and Paris. On the east and west banks are the Paris and Galt moraines respectively, which are responsible for the special glacial features giving the area the rolling topography for which it is well known (Nelson and O'Neill, 1989:31). Many of the lands containing these special features are privately owned (Moull, pers. comm.).

The Regional Municipality of Waterloo and Brant County serve as a good comparison between one playing an active role in natural area protection (RMW), and one which is not (Brant County). There are many challenges which face their governments in the formation of a co-ordinated protection system.

Methods

In order to complete an inventory of techniques and agencies involved in natural area protection within the Waterloo-Brant region, a literature search was undertaken of information pamphlets and other relevant documents. It soon became apparent that the list of agencies involved in some way in natural area protection was extensive, and beyond the scope of this paper. A decision was made to focus only on the major agencies, and the major programs which they use within the Cambridge-Paris area. After further literature review, the examination of these agencies and programs was narrowed in scope to the area encompassed by Waterloo Region and Brant County.

An interview guide was thus drafted for use in interviews (Appendix A). Interviews were held with various knowledgeable persons in government agencies and private groups during the month of July. Because of the timing (peak summer) interview times were difficult to establish. Where personal interviews could not be arranged, telephone interviews were used. A total of 14 interviews were completed (see References: Personal Communications). A great deal of new and useful information and documentation which had previously been inaccessible was received during the interviews. The final product (this paper and tables) is a compilation of information gathered between May and August, 1989. The final draft was reviewed by agency representatives.

Basic Questions

Three basic questions are addressed in this paper in order to understand, as fully as possible, the protection system which now exists.

- 1) What is the range of techniques which exist for use in protecting natural areas?
- 2) Which are the relevant agencies or groups, what are their natural area protection programs, strengths and weaknesses, and which legislation and policies apply?
- 3) What are the problems with and possibilities for the natural area protection system within the Cambridge-Paris area?

Limitations

It is important to realize that this paper has several limitations. It inventories only major agencies and programs which deal with special non-urban natural areas, so designated by recognized land management agencies. It does not cover the spectrum of municipal parks, green

space and other smaller recreation and natural areas in cities, which may play an important role in linking non-urban natural areas. These smaller areas need to be studied as a supplement to this paper.

A comprehensive list of all actors involved in natural area protection is not possible. There are too many small local groups and other agencies which in some manner or other play a role. The same can be said for some programs which relate to the topic.

Information for Maps 1 and 2 was compiled from maps supplied by the Grand River Conservation Authority (GRCA), the Regional Municipality of Waterloo, and Paul Eagles of the Department of Recreation and Leisure Studies, University of Waterloo. Boundaries shown are tentative in some cases in the RMW. In Brant County, the boundaries are those only suggested by original surveyors, and are not officially recognised by the County. The main purposes of the map - to illustrate the study area, the similarity and conductivity of sites which have been identified by major natural area inventories, and the confusion which has developed regarding area boundaries - is not seriously affected by changes in the information.

Finally, the historical information presented here is limited to the knowledge of those people interviewed. Time also placed a major limitation on this paper. Since the research was done during the summer months, the availability of knowledgeable persons was limited.

STRATEGIES FOR PROTECTION

A wide range of protection techniques exist for natural areas. These techniques fit into three broad categories of protection strategies; land acquisition (A), private stewardship (S), and the government forum (G) (Barrett and Riley, 1980:54-55; Haigis and Young, 1983:3; Hilts et al., 1986:51-58). Each strategy works on a different set of assumptions. Use of techniques within the study area is indicated wherever such information was available. Where not indicated, techniques may or may not be in use. Table 1 illustrates the use of various techniques by major agencies within the basin, and their program strategies which are discussed later in this section.

Considerations

Within each strategy type are different techniques which provide varying degrees and types of protection. Strategies used are dependent upon the specific purpose of the project, as well as the constraints to which the agency is subjected (Haigis and Young, 1983:9-11).

Expense or cost of implementation can be very important. More than the initial start-up costs are involved. Most programs work on limited budgets so, although some strategies may provide better protection, they are unaffordable. Long-term maintenance and other hidden costs may also be incurred. Agencies must be sure that they are able to provide the required staff, administration, and/or available funds the strategy requires. The necessary staff and time commitment can be expensive; agency staff are often quite busy with other duties, and do not have the time to commit to further projects (Carleton, pers. comm.).

Length of protection provided by a strategy is a significant consideration. There is little use in protecting an area in the short term if, in the long term, it will be degraded or destroyed. Some programs are run on a limited life-span due to limited funding, reducing their effectiveness (MacMillan, pers. comm.). The length of protection can also depend on the legal base of the technique. Those with a legal base (e.g. a written agreement) tend to provide a higher degree of long-term protection than do those without, due to enforcement ability.

Degree of control is an important part of protection. Without the ability to enforce, there is no way of ensuring effectiveness. Enforcement ability can be judged, for example, by how easily the terms of an agreement are violated, and what recourse is available to the parties involved. Effective enforcement also depends on the strength of the legal base, available staff and other support measures. Effectiveness without a legal base is limited to the goodwill of those involved.

The Land Acquisition Strategy

Land acquisition (indicated by an A in Table 1) has been a major focus for management and protection efforts by many agencies and organizations in the past. It can be used in conjunction with other strategies to strengthen various programs. Limitations include high expenses for both initial purchasing and continuing maintenance and property taxes. Decreasing budgets and increasing property values present challenges for this strategy (Barrett and Riley, 1980:54). However, land tenure provides long-term, complete control over unsuitable land uses. Land acquisition is conducted principally through two methods: purchase and donation.

Purchase

Several types of land purchase techniques exist (Haigis and Young, 1983:6-7; Diamant et al, 1984:29, and Hiltz et al., 1986:63-65). Each technique has situations where it is particularly useful.

Outright purchase is the simplest form of acquisition. Land is purchased at market value from a landowner by an agency. Title for the land is either maintained by the purchasing agency or transferred to a management agency. Many agencies with the Waterloo-Brant area practise outright purchase, including the Ontario Heritage Foundation (OHF), the Grand River Conservation Authority (GRCA), and the K-W Field Naturalists (Lamb, pers. comm.).

First right of refusal is used for properties where the landowner is not yet ready to sell. Through this process it is agreed that the interested agency will be contacted when the owner wishes to sell the identified plot, and will be given first chance to purchase it at the current market value. If the agency is no longer interested or cannot afford the land, the owner is free to search out other buyers. This process is not enforceable. Should the interested agency not be contacted, they have no recourse. The GRCA's Carolinian Canada Program (CC) and the Ontario Ministry of Natural Resources (OMNR) Areas of Natural and Scientific Interest (ANSI) have attempted to make use of this technique, but have encountered problems with lack of contact from landowners when lands are placed on the market (MacMillan, pers. comm.).

Instalment sales provide for payment for a property to occur over time through a number of smaller payments. This process provides an opportunity for agencies to gather money for the purchase of the land. The transfer of ownership is set for a future date.

Sale and/or lease back is a method of using restrictive covenants. The targeted land is bought and a covenant attached to the deed. The land can then be resold or leased for appropriate use. This method allows a limited amount of money to protect a number of areas as the money is recovered on resale. Some funds may not be recoverable due to a drop in market value caused by the land use restrictions. The OHF, has considered use of this technique (OHF 1988:47).

Bargain sales involve the sale of property at less than market value to a charitable organization. The difference in price can then be used as a charitable donation and a tax receipt

issued. This method is commonly used by government agencies in Ontario (Hilts et al., 1986:65). The OHF encourages donation of conservation easements by assessing the value of the easements for income tax and supporting reduced property tax assessments (OHF, n.d.:28).

Reserved life estates involve the purchase of a property, allowing the previous owner and possibly his children life-long use of all or parts of the property.

Leasehold estates are finite, long-term lease arrangements. They involve an agency or group in leasing land for a set period of time. In return for rent, the agency retains complete control over land use during the set term.

Restrictive covenants are a formal control of land uses which are attached to the deed for the land by the owner, prior to sale. The covenant acts to limit future uses of the land according to specifications. Restrictions are transferred with the deed to future land owners.

Conservation easements involve the purchase of partial rights to a property by an agency. The purchase price of the easement is determined by the difference in market value before and after the easement has been added. Once purchased, the easement remains on the deed, binding future owners to the prescribed restrictions indefinitely. Although conservation easements are strongly enforceable, only public agencies may legally keep or accept lands with conservation easements attached to the deed (Hilts et al., 1986:62; Haigis and Young, 1983:6). Many agencies have begun to make use of this technique. The OMNR's ANSI program has purchased partial rights for some privately owned lands which fall within their ANSI boundaries (Conservation Council of Ontario, 1989:47-48; OMNR, 1987:9). The OHF also makes use of conservation easements for natural heritage sites, although they have traditionally used them extensively for human heritage sites (Hilts et al., 1986:61).

Donations

Donations and bequests can be combined with much the same options as purchase. Use can also be made of restrictive covenants, easements, and reserved life estates. Donations refer to those lands gifted to an agency through two different means: (1) a Bequest is a term used to by lawyers for a donation given while the owner is still living; (2) a devise refers to lands donated through a will (Hilts et al., 1986:67).

The tax benefits are often a motivating factor behind donations. When donations are made to a non-profit, charitable organization, tax deductions can be substantial. Depending on the recipient agency, tax deductions range from 20% of the donor's annual income over five years to 100% of the annual income (Hilts et al., 1986:67). The OHF makes use of tax benefits to encourage donation of lands or easements. The Grand Valley Conservation Foundation (GVCF) was established to receive donations of land or money for conservation within the basin (GVCF pamphlet).

The Stewardship Strategy

This strategy type (indicated by an S in Table 1) is a combination of a variety of techniques. They all have in common a process of encouraging private landowners to take care of their own lands (private stewardship) through education and incentives. This is a particularly important strategy as it builds public appreciation of and awareness for natural areas.

Landowner contacts are a method of co-ordinating efforts for protection of private lands. The process begins with a visit to the landowners to inform them of the special characteristics of their land, and to get a sense of their level of interest in protecting the land.

Information on incentive programs available to encourage private stewardship is given to the landowners. A substantial time commitment from the agency is necessary to keep in touch with landowners. However, it is argued that the lower costs allow a higher number of properties to be protected than would be possible through acquisition (Moull, pers. comm.): The outcome, often a handshake agreement to take care of the land, is itself unenforceable. However, the contacts often work toward eventually placing the land under a formal agreement. The OHF, through the National Heritage League, started a landowner contact program which has been used to co-ordinate programs run by the OMNR, GRCA, and others. The City of Waterloo has recently shown an interest in using the landowner contact program for the Environmentally Sensitive Areas (Roth, pers. comm.).

Stewardship awards are an informal way of acknowledging a handshake agreement with the landowner. They cost little more than the paper they are printed on, encourage the landowners to continue their efforts, and provide for excellent free media coverage for the particular program (Moull, pers. comm.). The Natural Heritage League (NHL) has implemented a Natural Heritage Stewardship Award Program for landowners who are interested in the long term protection of their land. The OMNR also has a stewardship award of sorts called the Natural Heritage Honour Roll which lists the names of landowners who have co-signed a letter of understanding to protect their land (OHF, 1988:47).

Management agreements are designed to be a degree stronger than an award program. They are used to control specific management aspects of natural areas, such as forestry practices. Agreements are usually written, but not necessarily legally enforceable. In some cases tax rebates are available to those landowners participating in agreements (Hilts et al., 1986:60). This technique is being used for implementation of the ANSI program, involving both informal and formal agreements with landowners in which a management strategy or more detailed plan is prescribed; and it is also used with OMNR Agreement Forests and Managed Woodlots (OMNR, 1987:9-10).

Tax rebates are a form of incentive to encourage private stewardship. Most are based on the amount of land involved, or the value of a property in the case of donations. They rely on certain conditions being met by the landowner for maintenance of the land, and are enforceable in that rebates can be recollected with interest should the agreement be broken. This technique has been used by the OMNR with their Managed Forests Tax Rebate, and the Conservation Lands Tax Rebate, both of which have been used to promote several programs including the ANSI and Wetlands programs (OMNR and OMMA, 1988 and 1989 pamphlets). The OHF conservation easements also make use of tax rebates for easements which have been donated (OHF, 1988:7-8).

The Government Forum Strategy

This strategy (indicated by a G in Table 1) involves various levels of government, from provincial through to local. It deals with planning and policy approaches to natural heritage protection.

Official Plans are policy documents produced at the local, county or regional level. They provide a proposed long-term plan for the use of lands within the agency's jurisdiction through zoning. The use of zoning for management of natural resources has increased in recent years. In cases where tiered plans exist, the lower tier plans (local levels) must conform with the upper tier (regional or county). Official Plans are not "set in stone", but allow a flexibility which gives councils some freedom for interpretation. Although the plans are expected to give direction for appropriate uses, many decisions are based on the design of the development proposal and the viewpoint of councils who review the amendments in the end (OMMA, 1985:1-

4; Walther, 1986:332-336). The OMNR Wetlands program aims to have designated wetlands recognised within municipal Official Plans (OMNR, 1989:17). The Region of Waterloo has used its Official Plan to recognise special natural areas as Environmentally Sensitive Policy Areas (ESPAs).

Zoning and by-laws are an extension of the Official Plan. They are enforceable in relation to the activities of private landowners. By-laws are very specific, relating only to specific sites, and contain statements controlling activities (Hilts et al., 1986:112). The OMNR hopes in the future to have municipalities enforce protection of Class 1 and 2 wetlands within a Restrictive Zoning category which would allow no developments (OMNR, 1989:18).

Transfer of development rights is a technique used occasionally by municipalities to persuade developers not to develop an area due to its natural heritage values. Rights associated with a piece of land are transferred to another, allowing, for example, for higher density development in an area than would normally be allowed. In exchange, another site of natural interest is left either partially or fully undeveloped (Haigis and Young, 1983:4-5; Roth, pers. comm.). The City of Kitchener has considered using this technique, but lower profit margins in high density developments have made it unattractive to development (Curtis, pers. comm.).

THE NATURAL AREA PROTECTION SYSTEM

A wide variety of government and non-government agencies and programs exist in the Grand River basin, which contribute to natural area protection. This section briefly discusses the history of some of the major programs operating within the Waterloo-Brant region. Management and planning arrangements, land tenure, program use within the basin and strengths and weaknesses are summarized in Table 1. Agency and program histories are discussed in the following text.

Evolution of the System

The evolution of the present natural area protection system is the response to stresses such as those discussed above. Various agencies and organizations from international to local levels have set about identifying what they feel to be valuable areas which need protection (see Table 1 for agencies, programs, and legislations). The first major global inventory of natural areas was conducted in the mid 1960s by the International Council of Scientific Unions (ISCU) and their International Biosphere Program (IBP). As a result of Canadian participation in this program, many relatively undisturbed, important natural sites were identified across the country (including the Waterloo-Brant region) with the idea of protecting areas for research and conservation. Data from the IBP is used today by other agencies as background information for their studies (Francis, pers. comm.).

Similar inventories have followed, at the provincial, regional, and local levels. Each has a focus on specific types of valuable areas, and most have resulted in the formation of related protection programs. The OMNR and the GRCA are two of the major agencies involved in natural area management at the provincial and regional levels. They have been involved in several major inventory projects: Areas of Natural and Scientific Interest (ANSIs), Wetlands, and Carolinian Canada (CC) (OMNR, 1989:1; OMNR, 1987:1; MacMillan, pers. comm.; GRCA, 1983: 3.31, 3.47, 3.35).

At the local level, many townships and municipalities have also initiated environmentally sensitive area (ESA) studies; some have incorporated the findings in their Official Plans, creating for example, Environmentally Sensitive Policy Areas (ESPAs).

These programs are added to the existing range of provincial parks, crown land, agreement forests and conservation lands, and are intended for various types of natural resource protection and appropriate uses such as recreation, education and, in some cases, extractive uses such as forestry. Many of these targeted or area-oriented programs are aimed at specific types of concern, such as wetlands. However, with a system so large, covering so many sites, and so frequently underfunded, a support system is needed. Non-targeted or general programs have therefore developed to reinforce and complement targeted programs (see Table 1, Programs column, Targeted (T) or General (G)). The general programs are also present at all levels, including funding and education programs such as OMAF's Land Stewardship Program, as well as tax rebates, trust funds, and local group initiatives such as the K-W Field Naturalists' informal acquisition and monitoring programs.

Selected Program Histories

The agencies summarized in Table 1 and many others play a part in natural area protection. However, a simple inventory does not give a complete picture of the importance of the agencies and organizations. Many of the programs have complex histories. Perhaps the best way to illustrate the "inner workings" of the system is to examine briefly the following selected program histories: (1) Natural Heritage League Stewardship Program, (2) Environmentally Sensitive Areas, and (3) Conservation Lands Tax Rebate.

These programs have been selected because they provide insight into the three strategy types, and they involve various levels of government, and a wide selection of agencies.

The Natural Heritage Stewardship Program (NHSP)

Historically, landowner contacts can be traced to The Nature Conservancy (TNC) in the United States and Great Britain. Through meetings with private landowners of natural heritage areas, a co-operative effort is directed toward protecting a site through voluntary agreement (Hilts et al., 1989:3).

In Canada, private stewardship dates back to the 1930s and the dust bowl, when concern focused on loss of soil and wetlands in western Canada; in 1938, Ducks Unlimited began concentrating on privately owned wetland preservation for duck habitat. From 1963 to 1975 the Canadian Wildlife Service (CWS) also participated in a wetland preservation program, the Land Easement Program, in which land was leased from private owners to ensure wetland habitats were not destroyed. Lack of funding ended the program in 1975 despite the fact that many landowners felt that the program was highly worthwhile. Other such private land stewardship programs are currently running in Alberta, Saskatchewan, Manitoba, Ontario, and Prince Edward Island, in part due to the success of previous projects and also to the budget cutbacks which many agencies are suffering (WHC, 1987:5-6).

In Ontario, an important private stewardship program is being run as a pilot research project by the University of Guelph and the Natural Heritage League. The NHL was formed in 1982 as a co-ordinator and innovator for natural heritage protection in Ontario. In 1983, the Federation of Ontario Naturalists' (FON) Nature Reserves Committee began a small volunteer project to contact and inform private landowners of the importance of their natural heritage sites. But in 1984, with OMNR encouragement, the NHL received funding from the OHF for

what was originally called the Landowner Contact Program, which had a function similar to that of the volunteer program started by the FON in 1983. From Windsor north to the Bruce Peninsula and east to near Ottawa, 150 private landowners of significant natural areas, designated by the OMNR, were contacted during the summer of 1984 (WHC 1987:22; Hilts et al., 1989:3).

Also in 1984, the Nature Conservancy of Canada (NCC), the World Wildlife Fund (WWF), Wildlife Habitat Canada (WHC), and the OMNR were working on details for a Carolinian Canada Program. Carolinian Canada is a zone containing the northernmost appearance of Carolinian species, and occurs south of a line joining Toronto and Grand Bend. By 1985, several sites had been identified within the Waterloo-Brant region, the largest of which was the Grand River Forest which lies in both jurisdictions.

By 1986, the Natural Heritage Stewardship Program, with funding from Ontario's Experience '86 program, was focusing on the Grand River Forest and its 67 private landowners. Of these, 39 were contacted personally and 29 showed an interest in the program. The rest were contacted by mail with information packages. Second contacts were completed with 26 landowners in the summer of 1987 and 25 agreements were established. Mapping of these private landowners has not been possible as data cannot yet be obtained from the appropriate sources. One landowner was presented with a Natural Heritage Stewardship Award which had been introduced in 1986 (NHL, 1987:10; 1986:6).

A 1987 internal review of the NHSP showed the program to be "a cost-effective tool that could have positive benefits to natural heritage protection in the long term" (NHL, 1987:17). The NHSP now receives funding from several sources including the OHF, OMNR, WHC, WWF, NCC, and recently has begun receiving monies from the Canadian National Sportsmen's Show, the Laidlaw Foundation, and the McLean Foundation to continue its work with ANSIs and Wetlands for the OMNR and WHC. Although limited, funding has allowed the release of the program's first semi-annual newsletter in Spring 1989, in an attempt to maintain contact with landowners. Maintaining contact with landowners is essential to the continued success of the program. However, financing for not only the newsletter but also the program remains uncertain (WHC, 1987:28; Moull, pers. comm.). Specific funding for the Grand River Forest contacts by the NHL has now ended and responsibility for its continuation rests with the lead agency for the Forest, the GRCA.

Environmentally Sensitive Area (ESA) Programs

The histories of Environmentally Sensitive Areas within the Regional Municipality of Waterloo (RMW) and Brant County provide a good comparison. The RMW plays an active role in an ESA program, whereas Brant County has no official program. When the histories are paralleled, they reveal the relevance of several factors important in the establishment of an ESA program. Discussed first below are the several key factors on which ESA programs rely. An absence or weakness in these factors strongly limits the ability of a program to develop (McCulloch, 1982:46-48, 245; Lamb, pers. comm.). An examination of the histories in terms of these factors follows.

Presently in Ontario, ESAs depend heavily on the existence of a regional government. The reorganization of municipal to regional level governments began in 1970 and had two purposes: to open communication channels among the municipalities, and to ensure co-ordinated implementation of regionally significant plans and policies. These two purposes were achieved through the legislation establishing the regional governments, which requires mandatory land use planning, the creation of regional Official Plans, and conformity of plans among levels of government. It is within Official Plans that the Environmentally Sensitive Policy Areas

(ESPAs) at the regional level, and Environmentally Sensitive Areas (ESAs) at the municipal level, are established.

The presence of special natural areas is obviously important for an ESA program. Most jurisdictions have natural areas which meet some of the 9 criteria which have been established and commonly accepted for selecting environmentally sensitive areas (Appendix B). Common sites include woodlots, areas which perform vital ecological functions such as water recharge, or landforms representative of a particular region. But not all municipalities have the unique sites for rare plant and animal species, unusual habitats, or areas of high aesthetic value which quite often spur on an ESA program.

Not only do these sites have to be present, but they need to be under some sort of development pressure. Areas with a high development pressure and growing populations develop a more structured planning system. Such areas also tend to have more funds available from municipal taxes.

The presence of universities plays an important role in providing initiative and manpower for conducting studies of ESAs. Many of the background studies for ESAs in this area of Ontario were initiated through the Environmental Studies Faculty at the University of Waterloo. Funding was frequently through government programs such as the Ministry of the Environment's (MOE) Experience program, which was designed for the creation of student summer jobs.

The credibility of background studies is an important factor. The credibility of low-budget, short-term studies (12-13 weeks during the summer), with inexperienced field crews (mostly undergraduates) and limited field checks, can be weak. Should an Ontario Municipal Board (OMB) appeal occur, the studies carry little weight.

The presence of a personality with a sincere interest in an ESA program is irreplaceable. A dedicated person in a council or planning department can supply the political will to make things happen. Citizen interest channelled through naturalist groups can also contribute knowledge to the success of an ESA program (McCulloch, 1982:46-48; Lamb, pers. comm.).

With the 1970 reorganization of municipal governments, Waterloo County became the Regional Municipality of Waterloo (RMW) in 1972. Brant County, however, due mainly to its rural character, remained as a county. Under the establishing legislation, the RMW was required to create a regional Official Plan within a set time interval. A similar plan was not required for Brant. The creation of the Official Plan in the RMW succeeded in opening communications between the cities of Kitchener, Waterloo, and others, through the creation of co-ordinated municipal and regional plans for the area (Thorsen, pers. comm.). Under the county system, the towns in Brant County (Paris, Brantford, and others) remained relatively isolated both from each other and from co-ordinating agencies such as the GRCA (Sinclair, pers. comm.).

Both Waterloo Region and Brant County have within their boundaries areas of special natural significance, identified by the ANSI, Wetland, and Carolinian Canada programs. The RMW and local municipalities have recognised many of these sites ESPAs or ESAs respectively. In contrast, little has been done in Brant County to give these areas recognition in county or municipal plans.

Development pressures vary quite significantly among areas, causing different reactions with respect to these natural areas. Waterloo Region has for a long time been the focus of industrial and population growth. In 1917 Kitchener appointed the first town planning

commission to exist in Ontario, to cope with growth issues. In 1967, the Waterloo County Area Planning Board (WCAPB) adopted a set of 12 goals of which three of the top four were environmentally oriented (McCulloch, 1982:38-53). This history of progressive planning leadership continued on throughout the evolution of the Kitchener government, and into the existing regional government. An Area Planning Board Ecological Advisory Committee was established in 1970 to provide expertise in environmental planning to the WCAPB. This committee was then reformed at the new regional level in 1972. Its purpose remains advisory on concerns relating to areas designated ESPA (McCulloch, 1982:70-72, 122-123).

Brant County is a more rural county than Waterloo, with comparatively low population levels and development pressures. As a result it has had little impetus to develop a complex governmental structure (Sinclair, pers. comm.). Without the regional form of government, communication among towns can be quite poor. No formal environmental advisory committees have been established for the county. Environmental planning remains at the municipal level. In some towns, informal advice from informed community groups such as the Grand Valley Trails Association plays an important role in environmental planning (Sinclair, pers. comm.). In small towns such as Paris, a large planning division is not needed. Environmental planning efforts therefore rely on one position, that of Town Planner, and are limited by the time and budget constraints of that person. Larger urban areas such as Brantford support a planning division. Brantford in particular also has a special committee, the Waterfront Advisory Committee, created in 1981. It deals with most of the town's environmental concerns but is limited by mandate to the lands adjacent to the Grand River. In 1990, the committee will be amalgamated with the Parks and Recreation Advisory Board leaving environmental concerns to the recreational plan (Sinclair, pers. comm.).

The presence of universities is another factor which is significantly different between Waterloo and Brant. Within the RMW, there are three universities, the Universities of Waterloo, Guelph, and Laurier. However, there are none within Brant County. The University of Waterloo has taken an active role in promoting the ESA program. In the late 1960s Professor Ralph Krueger encouraged the first formal ecological study of Waterloo County, and supplied a study team headed by Professor Robert Dorney to complete the project. In a 1970 study, the university suggested the idea of an Environmental Advisory Committee and provided a list of suggested members (McCulloch, 1982:46-48, 106-107). The University of Waterloo was also responsible for three important studies: *Region of Waterloo Environmentally Sensitive Areas Study* (Francis and Eagles, 1975); *Environmentally Sensitive Areas of Brantford, Oakland, and South Dumfries Townships in Brant County* (Eagles et al., 1978); and *Environmentally Sensitive Areas of Burford and Onandaga Townships in Brant County* (Eagles et al., 1979).

There is a substantial difference in the credibility of studies which identified the ESAs within Waterloo and Brant. While both official inventories were done by the University of Waterloo through funding by the Ministry of the Environment's (MOE) SWEEP and Experience programs, and are thus subject to the weaknesses discussed earlier, the Waterloo Region study holds much more weight. It is possible that the reason for its credibility lies with the number of previous studies by credible sources which serve to reinforce the inventory. In 1965-66, the Departments of Municipal Affairs and Highways were involved in studies on future land use and traffic studies respectively in response to post-war growth problems. However, each had problems co-ordinating their study results and so the Waterloo County and Area Planning Board (WCAPB), which was conducting an area-wide study for an Official Plan, was asked in 1967 to complete the Waterloo-South Wellington Regional Planning Study (W-SW Study) involving, among other things, a parks, conservation areas and green belts study by the GRCA. Before it was finished many agencies were involved, resulting in provincial contributions in the order of three quarter of a million dollars (McCulloch, 1982:49-50). In 1970, as an extension to the W-SW Study, Professor Robert Dorney and a class of University of Waterloo graduate students completed the Ecological Analysis of W-SW Region with the help

of the K-W Field Naturalists and the Department of Lands and Forests (McCulloch, 1982:47-48). In contrast, the Brant County ESA studies, to the best of the author's knowledge, stood alone until the ANSI and Wetland inventories were completed. Many of the sites identified through the ANSI and Wetland programs were similar to the sites identified by the Waterloo and Brant ESA studies. However, the boundaries vary significantly (see Maps 1 and 2).

Finally, it may have become apparent that there are several personalities whose names appear regularly in the history of the Waterloo Region ESA program. Professor Ralph Krueger, through his political and academic contacts, played an important role in facilitating communication between the University of Waterloo and the WCAPB. The well-respected name of Professor Robert Dorney also gave weight to some of the support studies that were carried out (McCulloch, 1982:47-48). Also it should be noted that the K-W Field Naturalists have always played an active role, providing support whenever possible. Their volunteer natural area monitoring program, begun in 1989, is the only continuous monitoring to be done of the ESAs in Waterloo Region to date. Unfortunately, with no main co-ordinating body, no university, and an inactive naturalists group in Brant County, there has been little chance for extra support of the ESA program (Sinclair and Lamb, pers. comm.).

To date within Waterloo Region, 69 sites have been officially designated as ESPAs and another 10 sites are presently being recommended for designation (see Map 1 for those within the study area) (RMW, 1989). Kitchener and Waterloo have recognized, within the cities' master plans for parks and open space, their own EPAs, as well as the Region's ESPAs (Curtis, pers. comm.). Little has been done about monitoring other than the K-W Field Naturalists volunteer program, and planning has been limited to Frameworks for Environmental Management which have been created for Oliver's Pond and Bog (ESPA #68), Steckle Woods (ESA) and Homer Watson Park (ESPA #31) (RMW, n.d.). In cases where the Regional Municipality of Waterloo has recognized ESAs designated at the municipal level, these have been zoned as open space in the Regional Official Policies Plan, meaning that any activity allowed by their present zoning (usually either agricultural, industrial, or residential) is allowed without check. Any requests for an activity which requires a change of zoning must be accompanied by an Environmental Impact Statement or an Environmental Analysis demonstrating that the change in use will not have a serious impact on the natural systems. However, the OMB is not traditionally in favour of limiting land rights. Often, should acquisition or other protection techniques not be appropriate, an Amendment to the Official Plan is required and either ESPA boundaries are adjusted to allow for the development, or the ESPA is removed from the Plan (RMW, 1985).

Conservation Lands Tax Rebate

The Conservation Lands Tax Rebate has been developed through the work of several key agencies. In Ontario's past, natural areas such as wetlands have been taxed strictly according to their zoning location, size and use. In most cases, this meant that taxes were paid at the rate for agricultural or residential land, so farmers especially were paying taxes for natural lands from which they had little or no income.

To make things even worse for the conservationist, incentives actually existed to encourage farmers to clear the land for agriculture. In particular, provincially subsidized projects for farm drainage of wetlands were eligible for a 60% property tax rebate. The indirect result was the economic punishment of landowners who kept their wetlands (Hilts et al., 1986:72).

In 1984, urged on by the increasing loss of natural areas and an increasing public interest in private stewardship shown through the Carolinian Canada, Wetlands, and ANSI programs, the Ontario Natural Heritage League took action (NHL, 1986:12). As an umbrella for many

government and non-government conservation organizations, the NHL created a proposal for *Untaxing Nature*. The proposal suggested that all natural and agricultural lands including forests, wetlands, and undeveloped lands form one new class, natural areas, for taxation purposes. Only those areas zoned as industrial, commercial, and residential would not be eligible for the rebate. A 60% rebate was proposed.

The provincial government's reaction was not terribly positive to begin with. However, continued pressure through lobbying by the Federation of Ontario Naturalists (FON) and other NHL members resulted in the province seriously considering the proposal by 1986 (NHL, 1986:12).

In 1988 the Conservation Lands Tax Rebate came into existence. Although it does not apply to all natural area types suggested by the NHL, the rebate does cover provincially significant areas identified by the ANSI, CC, and Wetlands programs. It is too early yet in the program's life to judge its success.

DISCUSSION

Although there are a large number of agencies and programs for protecting natural areas, they have to this point been focused on special natural areas. This approach leaves the areas which are not important enough to meet set criteria without protection, planning, or management.

A lack of co-ordination and communication develops easily in a large system where agencies follow their own independent paths. Isolation from other programs, due among other things to criteria used for site selection within each program, becomes obvious in Map 1 and 2, which show the boundaries or designations applied to particular natural areas (including GRCA lands, Wetlands, ANSIs and ESAs). This confusion in boundaries transfers to the public, whose understanding and co-operation is very important in an area where private ownership is dominant. Inter-agency co-ordination on these sites would not only make things less confusing, but would also strengthen the argument for their protection.

Varying governmental levels of natural protection programs, as outlined in the case histories, make co-ordination and communication difficult. Agencies need a chance to get together and communicate ideas and concerns. Yet workshops such as that organized by the NHL in November 1987 for Waterloo and Halton Region Environmental Advisory Committees is not possible when no equivalent group exists in areas such as Brant County. A system similar to a "Friends of the Grand" needs to be established with consistent working groups within the Grand River valley, involving non-government organizations and concerned citizens. Such group would provide a focus for natural protection and management efforts at not only the local but also the regional and county levels.

A more formal inter-agency committee with room for public input could be used to focus on the management and planning of a particular landscape unit such as the Grand River Forest. The committee would help to increase co-ordination among the various government agencies and their targeted and general programs. The committee would report regularly to a co-ordinating body, whose mandate would be to co-ordinate and propose activities, research, and planning and management within the Grand River basin. As an agency which already has a mandate for the basin, the GRCA is a logical candidate for a co-ordinating body.

A direct effect of targeted programs is the formation of isolated patches of natural areas or "islands". Collectively, these islands probably support lower levels of species diversity than would a similar-sized lot of continuous natural area. Linkages must be developed between these natural area patches in order to keep the sites healthy and

functioning properly in an ecological sense. The Grand River and its tributaries provide a natural corridor linking many of the natural areas. In many cases, much of the river bank is within floodplain or hazard lands and is unsuitable for development. Further development of natural corridors is being addressed by the GRCA and certain regions and municipalities through current Corridor Studies. Further research is also needed in this area as to the feasibility of using hiking trails, abandoned rail lines, hydro corridors and oil pipelines as possible corridors linking natural areas. The possibility of establishing communication with other agencies, such as the Ministry of Transport in relation to appropriate roadside plantings, also requires more investigation (Allen, pers. comm.).

With private stewardship becoming a focus for natural area protection, several concerns must be addressed. Private stewardship, because of its voluntary nature, does not guarantee protection. Movement toward written, legally binding agreements, covenants and easements is important and should be continued. Monitoring on private lands is another concern. Enforcement of programs, such as the new tax rebates for example, creates an indirect monitoring system for privately owned natural areas which otherwise would not be monitored. Public access to private lands needs to be investigated as it relates to urban and highly used recreation areas, landowner rights and responsibilities, and management agreements.

Efforts must continue for the education of both landowners and public officials. Without their awareness, understanding and support of natural area protection concerns, programs cannot be a success. The NHL and its educative abilities are becoming a well recognised and utilized resource. Outreach programs run by arboretums, the FON and associated members, and the GRCA also play an important role in public education. A new team member in natural area protection through education, whose potential has yet to be fulfilled, is the Ontario Ministry of Agriculture and Food (OMAF). In recent years OMAF has invested considerable funds in environmental concerns relating to agriculture through education, pilot projects, and research. Programs as outlined in Table 1 may prove particularly useful in that they reach one of the major categories of landowners which was not reached effectively in the past: farmers. Other new avenues for natural area protection need to be identified and implemented.

Finally, it should be noted that this is a first stage study in the sense that no attempt was made to review official plans and by-laws at the municipal level. Nor was any attempt made to assess how the various planning and management arrangements are working on the Grand. Further research is needed in these areas.

APPENDIX A

Interview Guide for Knowledgeable Persons

**Organization
Name**

**Division (if applicable)
Contact Number**

- Q 1. What is the basis of your involvement in natural area protection? (personal interests, legal basis, policy)
- Q 2. What natural area protection programs does your organization/agency run (or participate in)? What is their mandate? Are they monitored?
- Q3. What are their strengths and weaknesses?
- Q4. What in your view are the other major agencies / programs within the basin?
- Q5. What are their mandates, strengths and weaknesses?
- Q6. What is your opinion of the system as a whole, its needs, strengths and weaknesses?

Summary/Recommendations

APPENDIX B**Commonly Used Criteria for Classification and Identification of ESAs**

1. The area represents a distinctive and unusual landform within the municipality, Ontario, or Canada.
2. The ecological function of the area is vital to the healthy maintenance of a natural system beyond its boundaries, such as serving as a water storage or recharge area, important wildlife migratory stopover or concentration point, or a linkage of suitable habitat between natural biological communities.
3. The plant and/or animal communities of the area are identified as unusual or of high quality locally within the municipality, Ontario, or Canada.
4. The area is an unusual habitat with limited representation in the municipality, Ontario, or Canada, or a small remnant of particular habitats which have virtually disappeared within the municipality.
5. The area has an unusually high diversity of biological communities and associated plants and animals due to a variety of geomorphological features, soils, water, sunlight and associated vegetation and micro-climatic effects.
6. The area provides habitats for indigenous species that are rare or endangered regionally, provincially, or nationally.
7. The area is large, potentially affording a habitat for species that require extensive blocks of suitable habitat.
8. The location of the area, combined with its natural features, makes it particularly suitable for scientific research and conservation education purposes.
9. The combination of landforms and habitats is identified as having high aesthetic value in the context of the surrounding landscape and any alteration would significantly lower its amenity value.

(Eagles and Adindu, 1978:26-27).

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Table 1 : EXISTING INSTITUTIONAL ARRANGEMENTS FOR NATURAL AREA PROTECTION WITHIN THE GRAND RIVER BASIN

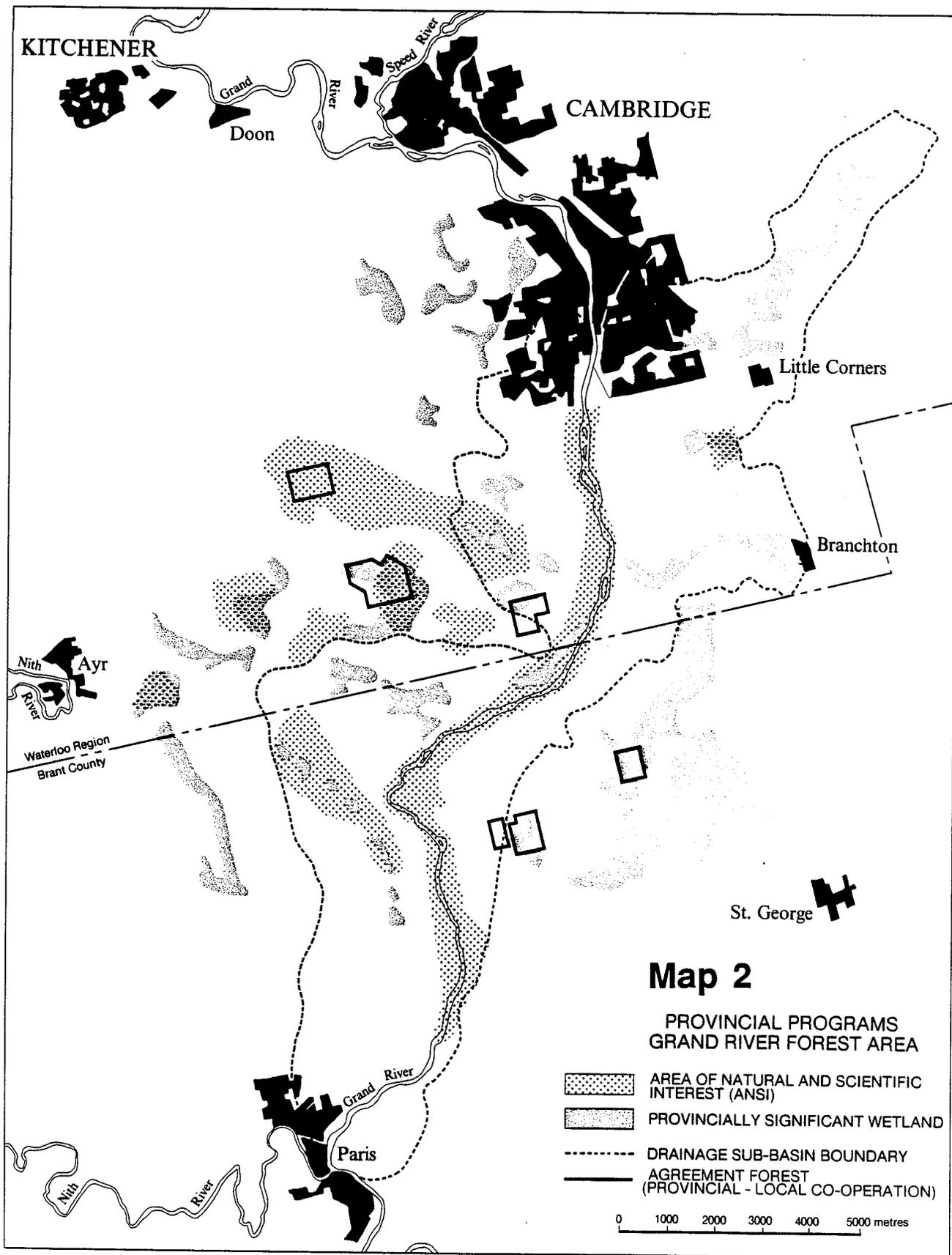
Agency or Organiz'n (<i>references</i>)	Programs Targeted (T) or General (G)	Applied Legis'n, Policy	Site Designation	Purpose	Tenure (priv, public or mixed)	Planning and Management Methods	Strategy Type (A, S, or G)	Comments
GOVERNMENT								
Federal								
Canadian Parks Service (CPS) (<i>Parks Canada, 1984, pamphlet</i>) (T)	Heritage Rivers System	*National Parks Act (1974) *Heritage Rivers Policy (1984)	Heritage River (proposed)	"To provide national recognition and ensure future management..."	Mixed	Heritage River status can be withdrawn if key attributes are lost or degraded	A,S,G	The entire length of the Grand is proposed for nomination as a test case due to its heavily settled nature. To ensure designation will require more coordination of agencies and programs.
Department of Fisheries and Oceans (DFO) (<i>DFO, 1983 and 1986, pamphlets</i>)	Fish Habitat Management Policy (G)	*Fisheries Act	Not Applicable (N/A)	"To reduce phosphorus in Lake Erie", and "reduce or arrest soil erosion that contributes greatly to water pollution"	Mixed	Under section 33.1 requires the review of development plans. If possibly dangerous to fish, the Minister may order changes. Fines up to \$50,000 or 2 years in jail OMNR is responsible for the reviewing projects, ensuring that no net loss of habitat is experienced	G	The Fisheries Act is a very strong piece of environmental legislation, carrying strong enforcement abilities.
Provincial								
Ministry of the Environment (MOE) (<i>OMNR, 1987 pamphlet, Nelson, pers. comm.</i>)	Soil and Water Environmental Enhancement Program (SWEEP) (G)	*Fisheries Act (1970) (FED) *Environmental Protection Act (1971) *Ontario Water Resources Act (1956)	N/A	"To improve soil and water quality in SW Ontario" through funding and demonstration projects	Mixed	Phosphorus levels will be S monitored by MOE and Env Can against goals set by the Canada-US Great Lakes Water Quality Agreement		Benefits from this program will be improved water quality for drinking, recreation and fishing. The program began in 1986 with a budget of \$30 million, and ends in 1991.
Ministry of Natural Resources (OMNR) (<i>Bell and Pascoe, 1988:153-156</i>)	Provincial Parks (T)	*Ministry of Natural Resources Act (1972) *Provincial Parks Act (1954)	Provincial Park - recreation	To protect provincially significant areas, to provide for citizens and tourists; recreation, natural heritage and appreciation	Public	Under Provincial Park Reg'ns access and activities are controlled. Parks and Rec'n maintains up-to-date registries	A,S,G	Although in a heavily settled area with a large demand for recreation facilities, only one recreation park exists Rock Point at Dunnville. A waterway park has been under consideration, but the cost of land acquisition is very high.
(<i>OMNR, 1987: 1-13</i>)	Areas of Natural and Scientific Interest (ANSI's) (T)	*ANSI Planning and Management Guidelines *Ontario Heritage Act *Provincial Parks Act *District Land Use Guidelines		To "encourage the protection of additional areas not regulated as provincial parks" through public and private contributions of land and funds.	Mixed	ANSI's of Provincial Significance or greater on Crown Land may be regulated as nature reserves under the Provincial Parks Act. District Land Use Guidelines (DLUG) suggest appropriate uses. Protection is given to private lands by owner request only, through conservation easements, and management agreements.	S, G	While ANSI's identify earth science and life science areas of value, there is no means of enforcing their protection on private land. In some cases the inventory conducted at district level was rushed, and areas were missed. Studies are continuing.

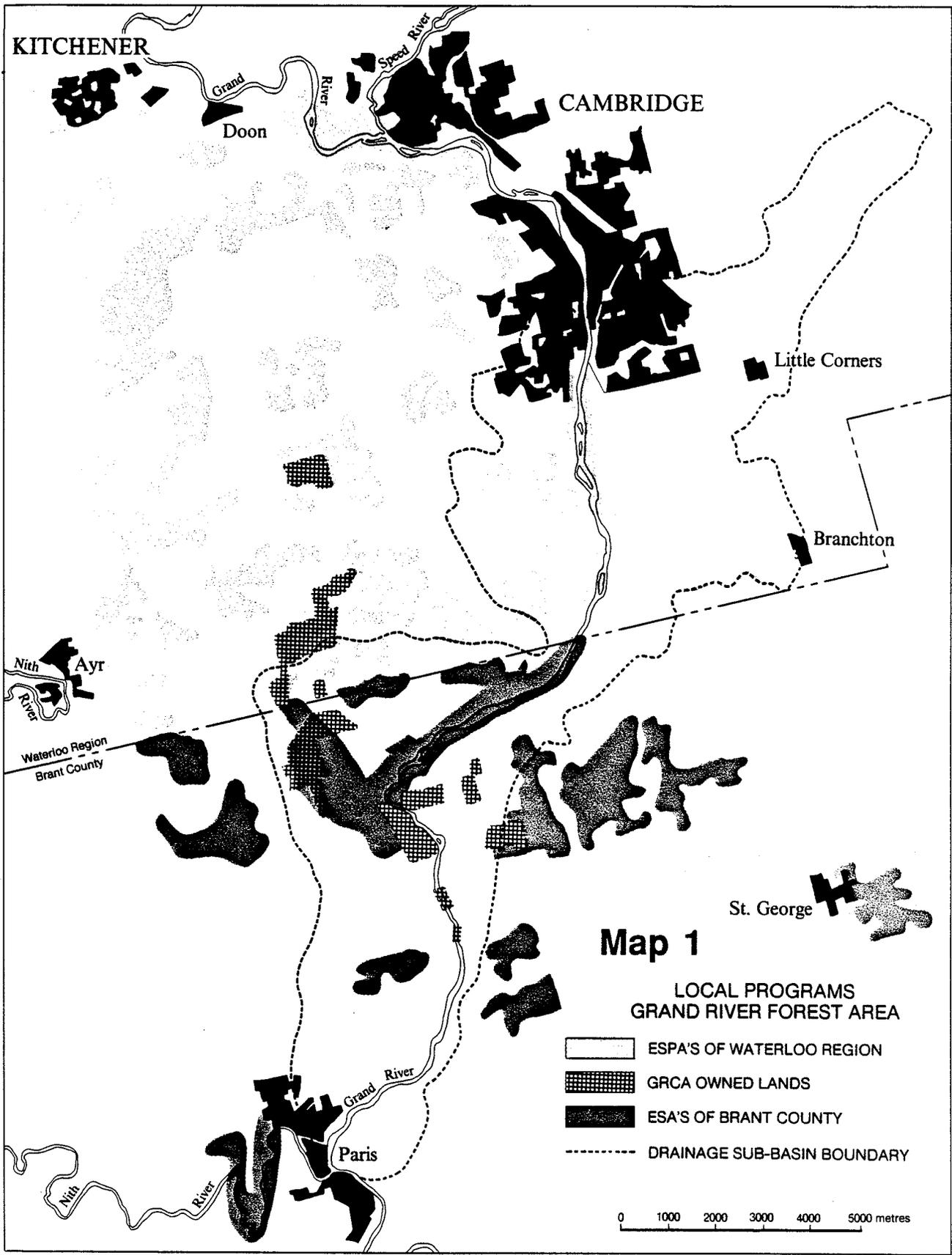
Agency or Organization <i>(references)</i>	Programs Targeted (T) or General(G)	Applied Legis'n, Policy	Site Designation	Purpose	Tenure (priv, public or mixed)	Planning and Management Methods	Strategy Type (A, S, or G)	Comments
Provincial (cont'd)					Provincial (cont'd)			
OMNR (cont'd) <i>(OMNR 1989:1-21, Roth, pers. comm.)</i>	Wetlands (T)	*Wetlands Policy (draft) *Fisheries Act *Planning Act	Wetlands Class 1-7	To identify and encourage protection of Ontario's wetlands	Mixed	Class 1-2 wetlands (class 3-7 optional) are protected through the Planning Act and municipal official plans; also through the Fisheries Act where fish habitat is threatened. OMMA through review of Official Plans, ensures municipal regard for the Policy. OMNR monitors in the field	A,S,G	Although policy identifies Classes 1-7, provincially, regionally, and locally significant, OMNR only defends against development Class 1-2. Conservation authorities, municipalities, regions, and counties are left to care for other classes through Official Plans. But they do not have empowering legislation to protect them. Recently, concern has developed regarding the criteria used to identify and classify wetlands. Studies are continuing.
<i>(OMNR, 1986, pamphlet)</i>	Wildlife Management Areas (T)	*Game and Fish Act	Wildlife Management Area	To provide habitat and management for wildlife	Mixed	Management advice and plans are offered to direct use, in return for public access	A,S	Luther Marsh is managed as a wildlife management area and is jointly managed by the OMNR and GRCA.
<i>(Bell and Pascoe, 1988:154)</i>	Crown Lands (G)	*Public Lands Act	Crown Land	"The disposition and management of crown lands..."	Public	Crown lands may be sold for development uses complying with District Land Use Guidelines	G	Very little Crown Land is left in the Grand basin.
<i>(OMNR, n.d. pamphlet)</i>	Community Wildlife and Fisheries Involvement Programs (CWIP,CFIP) (G)	*Game and Fish Act *District Fisheries Management Plan	N/A	"To help restore and improve wildlife and fish habitat" and "to encourage a public sense of stewardship..."	Mixed	Certain projects are funded on the understanding that monitoring will be continued eg. bird nesting boxes and use	S	Several projects have been funded through the K/W Flyfisher's Club, Waterloo Rod and Gun Club, Univ of Waterloo, the K/W Field Naturalists, and DU.
<i>(OMNR, 1989 pamphlet)</i>	Conservation Lands Tax Rebate (G)	*Conservation Lands Act	N/A	Up to 100% rebate to owners of designated Class 1-3 Wetlands, ANSI's, or conservation lands who are willing to commit to long term stewardship	Mixed	Rebates can be recovered up to 10 yrs plus interest if the area has been degraded. sites are audited randomly on an annual basis by OMNR officers	S	The rebate acts to encourage participation in programs such as Wetlands and in the valley. It applies only to areas > 0.5 acres (0.2 ha).
<i>(Bell and Pascoe, 1988:154)</i>	Agreement Forests (T)	*Forestry Act	Agreement Forest	To enter into agreements with various agencies to manage forests for forestry purposes	Public	Sites are owned publicly by municipalities, counties, GRCA and are managed and selectively cut by OMNR	S	Although managed strictly for forestry, sites provide limited habitat. Coordination between OMNR Forestry and Wildlife Div'n could improve this function.
<i>(OMNR, 1988 pamphlet)</i>	Ontario Managed Forest Tax Rebate (G)	*Forestry Act	N/A	Up to 100% rebate on Improved Woodlands or Agreement Forests to encourage the proper management of private forests	Mixed	See the Conservation Lands Tax Rebate	S	
<i>(Bell and Pascoe, 1988:154)</i>	Woodlands Improvement Agreements (T)	*Woodlands Improvement Act	N/A	"To enter into agreements with owners of private forest lands for the planting of nursery stock or stand improvement"	Private	Sites are privately owned and are managed and selectively cut by OMNR	S	Same as Agreement Forests, also, focus has traditionally been on the planting of coniferous forests. Consideration should be given to including hardwood species.

Agency or Organiz'n (references)	Programs Targeted (T) or General(G)	Applied Legis'n or Policy	Site Designation	Purpose	Tenure (priv, public or mixed)	Planning and Management Methods	Strategy Type (A, S, or G)	Comments
OMAF (cont'd) (GRCA, n.d. pamphlet)	Rural Beaches (G)	see above	N/A	To provide technical advice and funding ... to monitor water quality, and promote local awareness..."	Private	Unknown	S	This program is run cooperatively by OMAF and GRCA.
(OMAF, 1988, pamphlet)	Land Stewardship Program (G)	see above	N/A	"To provide grants and advice for the adoption of conservation farming practices...minimizing potential for environmental contamination from agricultural practices"	Private	Ontario Soil and Crop Improvement Assoc'n (OSCIA) officers inspect farms and project sites and forward grant applications for those who qualify under the program requirements.	S	This 3 year, \$40 million program began in 1988. It targets first-time adoption of conservation practices by farmers.
Regional								
Municipal, County and Regional Gov'ts (Lamb, L., pers. comm., and McCulloch, 1982.)	Environmentally Sensitive Area Studies (T)	*The Municipal Act *The Planning Act	Open Space Zones, Ecologically Sensitive Areas, Environmentally Sensitive Policy Areas (ESPA)	To identify and provide protection for areas containing significant natural features or ecological functions	Mixed	Developments within an ESPA subject to an EIA, sites are removed from Official Plans should the site integrity be lost. Management and planning within most areas is informal. EEAC committees have been established in some communities to advise on development in ESPA's. In K/W, the Field Naturalists group is involved in volunteer monitoring.	A, G	All counties in the watershed have ESA studies, but not all are implemented in Official Plans. The Grand River Forest in Waterloo-Brant Region is important, but only Waterloo has ESPA's in its Official Plan. The Official Plan acts as a guideline for development within ESPA's. Official Plans do not offer concrete protection, but do ensure that special attention will be given to development proposals within ESPA's.
(Curtis, K., pers. comm.)	Open Space Zoning and By-Laws	*The Planning Act *Official Plans	Open Space	Generally, to develop a system of linked open spaces including public and private lands	Mixed	Open Space zones consist of many types of recreational and natural areas. Planning is done through master plans for parks, open space, and recreation facilities. Enforcement is done through by-laws created in council.	A, G	Protection afforded by zoning is really a form of designation. Zones act as guidelines for development and can be changed with consent of municipal/regional council.
(Roth, D., pers. comm., Puddister, et al, 1982:32-36)	Tree-Cutting By-Laws	*The Ontario Trees Act	N/A	"To help to prevent inappropriate cutting or destruction of woodlots"	Private	Enforcement is under the by-law through by-law enforcement officers. Site plans for tree conservation are required for developments	G	The by-law existence and enforcement vary in strength with municipalities. Enforcement officers are reportedly often overworked and undertrained, with few prosecutions resulting under the by-law.
NON GOVERNMENT								
International								
International Council of Scientific Unions (ICSU) (Francis, G., pers. comm)	International Biosphere Programs (IBP) (T)	UNESCO Policy	IBP Sites	To establish long term undisturbed ecological sites for ecological research	Mixed	Suggestions are made regarding zoning arrangements, research, and monitoring.	A, S, G	Many sites were identified in Canada for Biosphere Reserves. Long Point is one reserve which has been established.
National								
Ducks Unlimited Canada (DU) (DU, n.d., pamphlet; Ambrose, pers. comm.)	Site Specific Projects (T)	Private Co-orporation	N/A	To preserve, restore, develop and maintain duck habitat	Mixed	DU monitors projects periodically as part of regular site maintenance	S	DU have been particularly active in Luther Marsh. The upkeep of duck habitat can cause species diversity to drop.

Agency or Organiz'n (<i>references</i>)	Programs Targeted (T) or General(G)	Applied Legis'n or Policy	Site Designation	Purpose	Tenure (priv, public or mixed)	Planning and Management Methods	Strategy Type (A, S, or G)	Comments
National (cont'd)								
Nature Conservancy of Canada (NCC) (NCC, n.d., and 1989, pamphlets)	Site Specific Funding	Private Co-orporation	N/A	"To preserve ecologically and environmentally significant land through acquisition"	Mixed	Lands are purchased and ownership is transferred to a land management agency. monitoring is done by the site management agency.	A	The NCC has been quite active in the basin, providing funding for CC.
Wildlife Habitat Canada (WHC) (WHC, 1987:1-2, OMNR 1989:5, GRCA 1988:6-9, Ward, 1987:133)	Education, research, and funding	Private Co-orporation	N/A	"To retain and steward wildlife habitats across Canada..."	Private	Goals, and strategies have been established, with wetland habitats their first priority	A, S	WHC is actively involved in providing funds for habitat protection through CC and especially the Wetlands program.
Provincial								
Ontario Heritage Foundation (OHF) (OHF, n.d., pamphlet, and n.d.:31-45)	Carolinian Canada Program (T)	*Ontario Heritage Act (1980) *Carolinian Canada Conservation Strategy	CC Sites	To develop and implement protection mechanisms through assigned lead agencies for areas of provincial or regional significance.	Mixed	Control of land through easements on deed; no established procedure for violations. Monitoring is done by annual visits and record review by OHF staff and volunteers	A, S	The foundation purchased several ANSIs within the river basin, and established a trust fund to support CC.
Natural Heritage League (NHL) (NHL, 1986: 1-3, and 1988, pamphlet)	Natural Heritage Stewardship Program (T)	*NHL Constitution	N/A	"To encourage owners of significant natural heritage sites to protect these features through private stewardship and to offer assistance whenever possible"	Private	As a Landowner contact and coordination program, enforcement varies with the program used on site. Continued owner visits, education, and a newsletter keep all parties informed.	S	Landowner contacts are being widely used in the river basin, as an alternative to acquisition. Many of the techniques involved are not enforceable, but work toward involving owners in legal agreements.
(NHL, 1988, pamphlet)	Natural Heritage Stewardship Award (G)	as above	N/A	"To recognize owners who are and wish to continue protecting the natural features of their property."	Private	Owners of specially designated lands are contacted and given an honorary award after they agree to maintain its qualities.	S	The awards are a way of encouraging the public to take pride in their land. Unfortunately there is no form of enforcement except continuing communication which is demanding of staff time.
Regional								
Grand Valley Conservation Foundation (GVCF, n.d., pamphlet)	"Leave a Living Legacy" (G)	*Income Tax Act	N/A	"To forward designated conservation projects in the Grand River watershed."	Private	Lands and facilities are acquired and ownership is transferred to the GRCA, who manages them with their other lands	A	The GVCF has completed several large projects in the valley including Nature Centres. It also manages 3 Conservancy Forest memorial tree groves, Wildlife and Wilderness Areas, and Source Areas.
Field Naturalist Groups (eg K-W) (Lamb, L., pers. comm., Martin, V., 1989)	Informal (G) acquisition, site monitoring	Personal Interest	N/A	Varies with club, generally to protect the ecological integrity of natural areas surrounding their municipalities	Private	Sites are targeted for purchase on the basis of OMNR, GRCA, and municipal inventories, and ownership given to GRCA as taxes and upkeep are expensive	A, S	Some groups are more active than others. The K/W group has acquired 3 properties in the RMW, and is involved in a volunteer monitoring program of the region's natural areas. The Brant County group is not involved.

Agency or Organiz'n (<i>references</i>)	Programs Targeted (T) or General(G)	Applied Legla'n or Policy	Site Designation	Purpose	Tenure (priv, public or mixed)	Planning and Management Methods	Strategy Type (A, S, or G)	Comments
Grand River Conservation Authority (GRCA) (GRCA, 1983:1-4) (<i>Veale, pers. comm.</i>)	Conservation Lands	*Conservation Authorities Act (1954) *GRCA Interim Management Plan	Conservation Area	"To further conservation, restoration, development and management of natural resources other than gas, oil, coal, and minerals"	Public	Conservation lands were purchased for flood control. Access to recreational areas is controlled by GRCA officers. The 1983 Interim Management Plan guides planning.	A	The GRCA owns 33 Conservation Areas within the basin.
(GRCA, 1989:1-2)	GRCA Basin Management Plan	*GRCA Policy	N/A	"To achieve a more coordinated effort among agencies, and to help in allocating MNR funding"	Mixed	The Plan provides a 5 and a 20 year strategy for all GRCA programs, and a guide to dev't on an inter-agency watershed basis.	A,S,G	The GRCA Basin Management Plan has yet to be officially accepted by the OMNR.
(GRCA, 1983:3.4)	Corridor Study (T)	*Conservation Authorities Act (1954)	Open Space (proposed)	To act as a comprehensive guide for development and redevelopment, through the co-ordination of all existing resource programs	Mixed	As a coordination program, the corridor study will make use of all presently existing programs, following regular procedures	A,S,G	The corridor study from Woolwich to North Dumfries Townships is the first in a series to reach the length of the Grand.
(GRCA, 1983:3.34, 3.37, MacMillan, W pers. comm.)	Flood and Fill Reg'ns (T)	*Guidelines and Procedures for Fill, Constr'n, and Alteration to Waterways Reg'ns	Flood Plain	"To prohibit or prevent increasing flood damages and potential loss of life as a result of new construction and development on the floodplain or hazard lands..."	Mixed	Land uses are controlled according to designation, by the processing of fill permits by the exec. committee where development is allowed	G	Special Policy Areas (SPA's) exist in Cambridge, Paris, Guelph, and Dunnville. The SPA's provide for more development to occur within floodplains than would normally be permitted.
(GRCA, n.d. pamphlet)	Source Area/ Wetlands Programs (T)	as above	Regulated Areas, "protected forests"	"To optimize resource benefits through the wise use and management of remaining wetlands..."	Mixed	Public ownership is felt to be most effective. Only those needing extensive management will be targeted for acquisition. GRCA ensures municipal regard for Wetlands Policy through Municipal Official Plan Input and Review	A, G	The GRCA works with municipalities on Class 1-7 wetlands, through review and input for Official Plans.
(MacMillan, W., pers comm, GRCA, 1988: 1-5)	Carolinian Canada (CC) (T)	*Letter of Understand'g from OMNR CC Management Philosophy and Statement	Carolinian Canada Sites (CC)	To protect 7 highly significant CC sites in GRCA jurisdiction	Mixed	CC is run cooperatively by a number of agencies, with a strong focus on stewardship. A GRCA Protection Subcommittee directs acquisition funds, and management of sites	A,S	The GRCA is the lead agency for the Grand River Forest site. The effectiveness of the landowner contacts program is limited as the program has a limited life span (1987-90) while encouraging stewardship requires continuous contact.
(GRCA, n.d. pamphlet)	Shade Tree Program (G)	as above	N/A	To assist landowners, with >2 ha of land, plant shade trees to help prevent aeolian erosion, stabilize stream banks and steep slopes	Private	A signed agreement is necessary and legally requires owners to protect trees for 15 years after planting. Periodic inspection is done by GRCA staff	S	This is the only program which encourages the planting of trees other than coniferous, and for purposes other than forestry.
Ministry of Agriculture and Food (OMAF) (OMAF, 1987, pamphlet)	Ontario Soil Conservation & Environ'l Protection Assis't Prog'm II (OSCEPAP II) (G)	*Ministry of Agriculture and Food Act *Agricultural Rehabilitation & Development Act	N/A	"To provide grant assistance for controlling agricultural soil erosion... and protecting water resources"	Private	Funds are allocated on a county or district basis, with payment only after an OMAF inspection	S	OSCEPAP II is a part of SWEEP, started in 1986 for 4 years with a \$22 million budget. It plays an important role in educating farmers about conservation. OMAF is felt by many agencies to play an important role in natural area protection due to its access to funds.





Recreation in the Grand River Valley

Pauline C. O'Neill

CONTEXT

In order to qualify for nomination to the Canadian Heritage Rivers System, a river must possess a combination of recreation opportunities and related natural values which together provide a capability for an outstanding recreational experience. Recreation opportunities may include such activities as boating, hiking, swimming, camping, wildlife viewing and human heritage appreciation. Related natural values include natural visual aesthetics; that is, diversity and quality of scenic beauty, physical essentials such as sufficient flow, navigability, rapids, accessibility and suitable shoreline. The river must also be capable of supporting recreational uses without significant loss of or impact upon its natural, historical or aesthetic values (Parks Canada, 1984:15). In addition to meeting both of the above guidelines, for a river to be judged to have outstanding Canadian recreational value it should possess water of a quality suitable for those recreational opportunities for which it is nominated.

The 1988 background study of The Grand as a Canadian Heritage River concluded that there is an excellent diversity of recreation opportunities in the Grand River valley, from relatively natural to urban, which derive their significance from the natural and human resources associated with the river and its history. This diversity of recreation opportunities is particularly special in the context of a settled, southern river.

No national parks and only one provincial park have been established within the boundaries of the Grand River valley. In addition to municipalities and the private sector, the Grand River Conservation Authority (GRCA) is a major provider of outdoor recreation opportunities in the valley. Conservation areas were originally designed to serve mainly as day use areas for the people of the watershed. However, an increased use of recreation lands occurred because of the growth in leisure time, as well as mobility and population changes, especially in urban areas. A greater demand was placed on conservation authorities to provide more diversified recreational facilities such as camping to help relieve some of the pressure, particularly in southwestern Ontario because of the large population centres within a few hours' travelling time of the Grand River valley (Leach and Sandilands, 1977b:18).

A number of studies have been completed over the last 35 years with respect to the recreation resources of the Grand River valley and the need for open space planning along the banks of the river and its tributaries. In 1954 the *Grand Valley Conservation Report* discussed the urgent and ever-increasing need for public recreation facilities in the watershed, particularly public use of riverfront areas, as population growth and riverbank development began seriously to curtail access to the water (Ontario Department of Planning and Development, 1954:IV,1-IV,121). This report included concept plans for several of the first Conservation Areas, as well as recommendations for 125 picnic sites, 4 lookout points, and 6 scenic drives roughly paralleling sections of the Grand, Conestogo, Nith and Speed Rivers.

Ten years later the *Grand River Conservation Lands Study* emphasized the importance of recreational as well as utilitarian uses of the river, and the need to preserve suitable lands for public use before it was too late. The report noted the desirability of recreational uses for designated conservation lands, i.e. those subject to flooding or severe erosion and wooded areas with scenic value and/or scenic lookouts. It recommended that scenic drives and trails be developed along the valley in conjunction with designation of up to a quarter of a mile of territory on either side of the river as conservation lands, to be protected as a greenbelt and outdoor recreation corridor (Ontario Department of Energy and Resources Management, Conservation Authorities Branch, and Grand Valley Conservation Authority, 1964 and 1965).

After almost another decade the *Grand River Open Space Study* addressed many of the same issues at a larger scale. With the objective of optimum use of lands adjacent to the river for public open space and recreation, the report was essentially a concept plan for an almost continuous greenbelt along the river in the form of a system of parks and open space, trails and scenic drives from Kiwanis Park at the north end of Waterloo down to Highway 401 at the south end of Kitchener (City of Kitchener Department of Planning and Development, 1973). However no such greenbelt was ever formally created, and some natural heritage and recreation opportunities have been lost in the interim.

The current Grand River Heritage Planning Study builds on many of the proposals contained in these earlier studies with respect to the provision of recreation opportunities and protection of the associated heritage values.

PATTERNS

Natural Values

The themes under which the natural history of the Grand River valley is discussed are: geology/geomorphology; plant species and communities; and wildlife.

The bedrock and quaternary geology of the basin offer an impressive array of geological features as a result of the complex glacial history of the area. The river traverses four distinct physiographic landscapes on its way to Lake Erie. The headwaters arise on a gently rolling till plain, which gives way to the Waterloo Moraine (Sand Hills) around Kitchener. In the Fergus-Elora area the river cuts a deep, vertical walled gorge. Crossing the valley from Guelph through Cambridge are the Galt and Paris moraines, areas of extremely varied topography and drainage. Finally the river flows across a relatively flat lacustrine plain at Brantford, where it begins to meander. It was this low slope which permitted river boats to navigate this far up the river in the last century. Throughout the basin are many examples of kames, eskers, kettles, drumlins and spillways.

The vegetation of the watershed divides into two forest regions: the Great Lakes-St. Lawrence in the northern half of the watershed, and the Carolinian in the southern half. The degree of fragmentation of the original forest cover has been determined largely by the suitability of the land for agriculture. The flatter, well-drained areas have been extensively cleared, but many interesting pockets of natural vegetation remain, the three best examples of which are: the marsh-bog-forest complex around Luther Marsh; the Grand River forest and environs between Cambridge and Paris; and the extensive wetlands along the river from Cayuga to below Dunnville. The transition from one forest zone to the other, combined with the various landscape types in the basin, has created a mosaic of habitats which are surprisingly diverse, including bogs, marshes, upland and lowland deciduous and mixed-wood forest, and even some small remnants of prairie and oak savannah.

This highly focused distribution of natural areas presents special problems and opportunities for recreation and nature conservation. Because significant natural features tend to be clumped, recreation opportunities are enhanced, but so are management problems, since most of the land is privately owned. These major nodes also tend to be somewhat isolated from each other, making the movement of wildlife among them difficult. Although the river and its many tributaries form a kind of natural network which could facilitate movement between areas, a certain amount of management and restoration probably would be necessary for the system to become truly interconnected.

Recreation Opportunities

For the purposes of this report, significant recreational activities in the Grand River valley have been grouped into five activity themes:

Water Sports: canoeing, kayaking, sailing, power boating and water skiing, and swimming.

Nature/Scenic Appreciation: picnicking, camping, and naturalist activities such as birdwatching and photography.

Fishing and Hunting

Trails and Corridors: pedestrian and/or equestrian trails, scenic drives and/or cycling routes, and cross-country skiing or snowmobiling trails.

Human Heritage Appreciation: historic walking tours, historic buildings, and events and festivals.

Water Sports

The Grand River is described in the Ontario Ministry of Natural Resources (OMNR) publication *Canoe Routes of Ontario* as an ideal waterway for day trips (OMNR, 1981:96). The river passes by many historic attractions and, although it traverses populated agricultural and urban areas, its heavily wooded banks with their abundant wildlife recall the river as it once was. Canoeing on the Grand has become a popular activity, and numerous groups and organizations sponsor canoe outings on the river. While tributary rivers such as the Conestogo, Speed and Nith are navigable over limited stretches, the most consistent flow of water is on the main Grand River south of the Elora Gorge Conservation Area. The most popular canoe trip down the Grand is typically a one day journey over a 25 to 30 km stretch of the river. Families and groups are making increased use of two, three or four day excursion opportunities down the Grand, usually starting from Cambridge and continuing right to Lake Erie (GRCA, 1982:1-2). There are no major water control dams on the central and southern stretches of the Grand, although refurbished mill dams and canal weirs must be portaged at Cambridge, Paris, Brantford, Caledonia and Dunnville. Although there are many urban areas in the valley, a canoe trip down the Grand offers vistas of scenery and nature that are impossible to obtain by other means.

The Grand River is navigable for power boats for most of its reach below Brantford, and is effectively separated into three sections by the dams at Caledonia and Dunnville. Water skiing occurs mainly in the two sections above Dunnville. Power boats are allowed on the reservoirs at Belwood and Conestogo, and water skiing is popular in both of these locations. The river is wide enough below Brantford to accommodate small sailboats and sailboards, but use is limited because of the number of power boats. Sailing is popular on all the reservoirs: Belwood, Conestogo, Guelph, Laurel Creek, Shade's Mills and Pinehurst Lake.

People may swim in the Grand River and its tributaries wherever there is convenient access to the water. The GRCA administers 13 active conservation areas which provide opportunities for swimming in natural or man-made lakes and pools. Rock Point Provincial Park has 600 metres of beach on Lake Erie a short distance east of the mouth of the Grand. In

addition, there are many municipal and private/commercial parks which provide swimming opportunities.

Nature/Scenic Appreciation

A number of naturalists clubs in the valley conduct organized outings on a regular basis. In general, the natural areas which offer the best opportunities for viewing flora and fauna are: Luther Marsh; Elora Gorge; the Dumfries landscape complex between Cambridge and Paris; and the marshes in the Dunnville area. Provincial, regional and municipal governments as well as the private sector have all established picnic areas and campgrounds in the Grand River valley.

Fishing and Hunting

Fishing is a very popular activity along the Grand. Six fish species are virtually ubiquitous in the river and its tributaries: carp, bullhead, pumpkinseed, rock bass, white sucker and yellow perch. Other species found in the Grand include smallmouth bass, largemouth bass, black crappie, pike, walleye and salmon. In general, the diversity of fish species increases from the upper to the lower river. The GRCA stocks a limited number of rainbow trout at Conestogo below the dam; Rockwood; and two fish ponds at Belwood and Elora Gorge.

The GRCA works co-operatively with the Ontario Ministry of the Environment to monitor water quality, and with the Ontario Ministry of Natural Resources on assessment and rehabilitation of fisheries resources in the Grand River watershed. Funds from the sale of provincial resident fishing licenses are directed back to local fisheries improvement projects.

Opportunities to hunt waterfowl, small game and deer are found in many of the natural areas throughout the watershed. Luther Marsh and the Dunnville marshes are highly valued for hunting waterfowl as well as some small game; hunting for white-tailed deer is permitted in several public recreation areas between Cambridge and Paris managed by the Ontario Ministry of Natural Resources.

Trails and Corridors

Nowhere else in Ontario is the concentration of pedestrian trails as great as in the Grand River valley. There are three distinct pedestrian trail systems in the valley: the Grand Valley Trail, the Avon Trail, and the Guelph-Speed Trail. Both the Avon and the Guelph-Speed Trails link to the Grand Valley Trail. The Guelph Radial Line Trail and the Grand Valley Trail link with the Bruce Trail to the east; the Avon Trail links to the Thames Valley Trail to the west outside the Grand River watershed. This network provides for many recreation opportunities throughout the valley. The Grand Valley Trail in particular shows great potential for further development as a recreation corridor since it links many areas of natural and human heritage value (Hart, 1988:1).

The Grand Valley Trails Association, incorporated in 1974, maintains the Grand Valley Trail and promotes hiking and related activities in the region through which the trail passes. The trail was constructed in a series of three stages from Brantford to Elora between 1974 and 1977. In 1987, with a series of grants and private donations, the trail was expanded in one season from Brantford to Rock Point Provincial Park adjacent to the mouth of the river, for a total length of 250 km (Hart, 1989:187).

No statistics are available for any trails within the Grand River watershed to define use patterns. Current membership in the Grand Valley Trails Association is about 500, but it is recognized that many people outside of trail clubs use these recreation corridors as they link to

municipal trail systems, riverfront parks and conservation areas as well as traditional footpaths (Hart, 1988:2)

The GRCA maintains groomed cross-country skiing trails at Elora Gorge, Laurel Creek, Pinehurst Lake, and Shade's Mills. Many other conservation areas and public lands, particularly the OMNR Agreement Forests, are used on an unofficial basis. A map of scenic drives and points of interest has been developed for the Region of Waterloo (Waterloo Regional Heritage Foundation, 1986); but there is nothing comparable for the lower river.

Human Heritage Appreciation

Many opportunities exist to view historic buildings and sites throughout the Grand River valley, particularly in Elora, Kitchener-Waterloo, Cambridge, Paris and Brantford. Along the lower river from Brantford to Dunnville there are many visible remains of the system of locks and canals constructed in the 1830s by the Grand River Navigation Company.

Many municipalities in the Grand River valley have at least one public event or festival, such as a fair, every year. These are based on a wide range of themes such as music, agriculture or fishing. They vary considerably in scope and scale, and attract visitors accordingly. Major festivals in Cambridge, Brantford and Dunnville are based thematically and physically on the Grand River.

SIGNIFICANCE

The inventory and analysis of heritage features which was completed in the 1988 background report (Nelson and O'Neill, eds., 1989) and suggestions made by attendees at the 1989 public meetings resulted in the selection of six areas of special significance with respect to the guidelines for the Canadian Heritage Rivers System. These areas are: Luther Marsh; Elora and Elora Gorge; Rockwood; St. Jacobs; Cambridge to Paris; and the Dunnville area. This section is a more detailed inventory and analysis of the natural values and recreation opportunities in each of these areas.

Another potential node or area of special significance is the Six Nations/New Credit Reserve and the associated historic sites in the Brantford area, which offer many valuable and unique recreation opportunities based on human and natural heritage themes. These have not been considered in detail in the present report because the native people chose not to participate in this study.

LUTHER MARSH

Natural Values

The reservoir at Luther Marsh was completed in 1954 by the Grand River Conservation Commission through construction of a concrete spillway and earthen dyke across Black Creek, a headwater tributary to the Grand River upstream of the village of Grand Valley. The reservoir has a surface area of nearly 14,000 hectares (3,500 acres) and provides a refuge for a rich diversity of fauna and flora.

Almost immediately following the filling of the reservoir, Luther became an important area for waterfowl. Although changes have occurred in the species utilizing Luther, it continues to be the largest, most valuable inland marsh in southern Ontario. Many species of waterfowl have nested successfully in the area; when these are combined with migrating flocks

of ducks and geese which stage at Luther Marsh in spring and fall they produce a population consistently over 25,000 birds. Over 237 species of birds have been sighted at Luther (GRCA, 1978:1); 134 have bred in the area (Cadman et al., 1987), including common loon, red-necked grebe, great egret, canvasback, and osprey.

Among the 260 species of animals which have been identified at Luther are the uncommon mink frog, ribbon snake and spotted turtle. The variety of vegetative communities ranges from abandoned farmland and conifer plantations to hardwood bush and dense cedar swamp. The Wylde Lake area is considered to be one of the best examples of boreal bog now existing in southern Ontario. Over 400 different plants have been identified including several which can be considered rare, for example, showy lady's slipper, wood lily and round-leaved sundew (GRCA, 1978:1-2). Twenty-one significant biotic communities have been identified at Luther (Ecologistics Ltd., 1982a).

Recreation Opportunities

Water Sports

The shallow and weedy waters of the marsh are not suitable for swimming, and no motor boats are allowed. Canoeing is the best way to access the interior of the marsh, although care must be taken on windy days because of the wide expanse of open water. The area is large enough to get away from any obvious evidence of human disturbance.

Nature/Scenic Appreciation

Three picnic areas and four observation towers are located at access points around the edges of the marsh (Map 1). The opportunities for naturalists are apparent from the extremely high diversity of species present in the area.

Fishing and Hunting

Sport fishing is quite limited at Luther because of the shallow and weedy aquatic environment; some perch and catfish may be caught. However, the area is highly valued for hunting waterfowl, small game and deer. Overcrowding by hunters has made it necessary to control the number using the marsh on peak days, and four controlled hunting days have been established during the season when daily hunting permits are issued on a first come, first served basis. Entrance is limited to two access points where a maximum of 450 hunters are allowed entry at any one time. During the 1988 controlled hunt at Luther, 664 registered hunters shot 1,300 ducks and geese (GRCA, 1988:33).

Trails and Corridors

The Grand Valley Trail does not extend to the northern limits of the watershed. Within the Wildlife Management Area at Luther two short nature trails have been developed; there are also many old roads which provide relatively dry access to the interior of the marsh during the summer, and are used for cross-country skiing and snowmobiling in the winter.

Human Heritage Appreciation

The history of the development of Luther Marsh is an interesting case of human adaptation to and modification of the landscape in a riverine environment.

ELORA AND ELORA GORGE

Natural Values

Within the town of Elora, the Grand River tumbles over a 50-foot waterfall and winds its way for almost a mile and a half between sheer walls of dolomitic limestone. A short distance from the waterfall the Grand meets the waters of Irvine Creek, which flows through an equally impressive gorge for almost a mile from the village of Salem. The walls of the gorge are about 85 feet high, and form a unique scenic attraction.

Gently rolling, rocky terrain covered generally by evergreen forest ribbons both sides of the gorge. The most common species is white cedar which seems to grow in all types of soil regimes, from tenaciously clinging to the gorge walls to the fertile loams on the uplands. It is the understory vegetation of vascular and woody plants that makes the Elora Gorge particularly significant for naturalists. Many naturalists have reported rare habitats within the gorge where plant species of significant populations occur which are infrequent in southern Ontario. The rare plants of the gorge include smooth cliff-brake, butterwort, grass-of-parnassus, Kalm's lobelia, white camass, and green spleenwort. All of these plants grow in the cool, moist dolomite of the gorge walls and bottom (Postma and Sandilands, 1977:2-9).

The wildlife of the Elora Gorge is very limited and common to the watershed. Small mammals are quite common, and white-tailed deer are often seen during the off-season months. Bird life is restricted to those species which can sustain moderate recreational pressures especially during nesting season.

Recreation Opportunities

In 1954 the GRCA acquired 145 hectares of land along both sides of the gorge and established Elora Gorge Conservation Area to maintain the natural beauty of the gorge and provide a recreational resource.

Water Sports

The river is not suitable for recreational canoeing within the conservation area, but the gorge is often used for kayaking and whitewater canoeing during the late spring and early summer when the water levels are highest.

Swimming in the gorge is very popular in the summer when the water levels are low; riding the rapids on an inner tube is an exhilarating experience. Additional swimming opportunities are provided at a 2 1/2 acre swimming lake created by the damming of a small stream.

Nature/Scenic Appreciation

There are 500 individual campsites and approximately 400 picnic sites in the Conservation Area, as well as group camping facilities. Elora Gorge is the most heavily used of all 13 active conservation areas administered by the GRCA, as indicated by the following statistics selected at five-year intervals:

<i>Year</i>	<i>Camping</i>	<i>Day Use</i>	<i>Total</i>
1978	87,600	103,207	190,807
1983	141,648	79,943	221,592
1988	86,556	82,123	168,679

Elora tends to draw visitors from a fairly wide area, as indicated by the data collected in a summer user survey in late August, 1982 (GRCA, 1983:6-10), and a camper origin study in 1972 (Mason, 1975:82).

In addition to the short-term camping opportunities at Elora Gorge, 50 seasonal campsites are operated by the GRCA at Elora Pines Conservation Area a short distance downstream.

Fishing and Hunting

Northern pike are regularly caught within the gorge, and brown and rainbow trout have been reported within the deep potholes of the gorge. There are also warm water fish species including brown bullheads, rock bass, smallmouth bass, and yellow perch. The water impoundments in the Conservation Area are stocked annually with rainbow trout.

Trails and Corridors

Within Elora Gorge Conservation Area there are trails through the wooded areas along the edges of the gorge, and in the winter there are over 10 km of groomed cross-country skiing trails. The Grand Valley Trail passes through the Conservation Area on the west side of the gorge and continues into the town of Elora; a scenic driving tour of Waterloo Region also loops through Elora.

Human Heritage Appreciation

The cultural history of Elora is being revived with the refurbishing of old buildings and shops into boutiques, restaurants and craft shops, particularly along the main street adjacent to the river. While the authenticity of some of these renovations may be questionable, they are a very important recreation and tourism resource. In addition, the Three Centuries Festival of music is held annually in the Elora area.

ROCKWOOD

Natural Values

Rockwood is the site of the largest known pothole in the world, the Devil's Well, and is of national significance geologically. It also has the highest concentration of potholes in Ontario, numbering some 300 (Bowes, 1989:34).

Rockwood Conservation Area was acquired by the GRCA in 1958 to protect this scenic resource from exploitation. The area is unique not only to the Grand River basin but also to southern Ontario. Bisecting the area is the Eramosa River, which was dammed in the past to form two small mill ponds.

Recreation Opportunities

Water Sports

Two mill ponds in the park formerly supplied water power for a woolen mill and a grist mill, but now serve as park lakes for swimming, fishing, and canoeing. No motorboats are allowed.

Nature/Scenic Appreciation

The Conservation Area provides extensive day-use opportunities and a limited amount of camping. Data from a day-use origin survey conducted in 1972 indicated almost 42% of visitors came from outside the Grand River watershed, primarily from Hamilton, Burlington and Toronto (Postma and Sandilands, 1978:14). In 1988 Rockwood was the 5th most heavily used of the conservation areas. Use statistics selected at five-year intervals are as follows:

<i>Year</i>	<i>Camping</i>	<i>Day Use</i>	<i>Total</i>
1978	13,504	57,944	71,448
1983	29,236	45,630	74,866
1988	33,609	47,332	80,941

Fishing and Hunting

Fish to be caught at Rockwood include smallmouth bass, rock bass, sunfish, rainbow trout and pike. The smallmouth bass population is self-sustaining; the trout are stocked annually. No hunting is permitted in the area.

Trails and Corridors

A network of nature trails has been created in the undeveloped section of the area. The nearest major pedestrian trail is the Guelph Radial Line Trail, but it does not connect with the conservation area.

Human Heritage Appreciation

The ruins of the woollen mill date back to 1867.

ST. JACOBS

St Jacobs is significant for the opportunities it offers to appreciate an important theme in the human history of the Grand River valley, which is the Mennonite settlement in this area. In St. Jacobs the mark of the Mennonites is still very distinct. "Jacobstettel" or the town of many Jacobs was founded around the middle of the last century by Jacob C. Snider. Snider's flour mill was the first roller mill in North America; originally imported from Austria, the mill was purchased in 1875.

Many artisans have become established in St. Jacobs, and have converted the old mill and factory buildings beside the Conestogo river to studios and shops. The Meetingplace is an educational venture to help visitors understand the history, culture and beliefs of the Mennonites, some of whom still work their land with horses and own no means of transportation other than buggies. The Maple Syrup Museum is the only one of its kind in Ontario.

CAMBRIDGE TO PARIS

Natural Values

The outstanding feature of the Cambridge to Paris area is the Grand River Forest, an unbroken stretch of Carolinian forest 20 kilometres in length. It is a provincially significant ANSI and a Carolinian Canada site. It contains a number of biotic communities and several provincially rare species, including Oswego tea, downy false foxglove and yellow mandarin.

Elsewhere in this area exists a remarkable mosaic of communities, including bogs, fens, and remnants of prairie and oak savannah, in addition to extensive upland and swamp forest. This area is one of the most significant aggregations of natural areas in Ontario, with an unparalleled diversity of habitat types.

Recreation Opportunities

The GRCA operates two active conservation areas in this section of the valley, Pinehurst Lake and Shade's Mills.

Pinehurst Lake Conservation Area has been operated as a multi-use recreation area since 1954, and was the second area to be developed for recreational use by the GRCA. It is 104 hectares in size, and is centred around a 10 hectare spring-fed kettle lake, one of many in the Dumfries area. Northern pike, largemouth bass and bluegill may be caught in the lake. The area surrounding the lake is gently rolling upland hardwood. Because of the natural features of the area, the abundance and diversity of forest cover and water supply, a great variety of wildlife has been observed at Pinehurst. Of note are breeding populations of golden-winged warblers, blue-winged warblers, cerulean warblers, blue-gray gnatcatchers and yellow-throated vireos. Blanding's turtles are common in many of the small ponds. The area is in the Carolinian biotic vegetation zone, and supports a great many varieties of plants. Over 300 species are known to grow in the area, including some unusual or rare species. Noteworthy are broad beech fern, green adder's-mouth orchid and yellow star grass. The area contains a number of special features; the International Biological Program considered Pinehurst to contain an excellent diversity of tree and plant species as well as a number of rare plants and birds of biogeographical interest. The steep sand ridges, the greatly varying topography and the kettle lake combine to make the area of geological interest. The well treed rolling to steep topography results in the area being very aesthetically pleasing (Leach and Sandilands, 1977b:2-12).

Visitor use of Pinehurst Lake is consistently heavy, as indicated by the following statistics selected at five-year intervals. The shift in numbers from day use to camping is a result of the development of additional campsites.

<i>Year</i>	<i>Camping</i>	<i>Day Use</i>	<i>Total</i>
1978	37,544	62,234	99,778
1983	54,694	46,884	101,578
1988	62,348	35,577	97,925

A summer user survey conducted in late August, 1982 found that the majority of visitors came from the Cambridge, Kitchener and Brantford area, generally no more than 20 miles away (GRCA, 1983:6-10). This was consistent with the findings of a 1972 study of camper origins (Mason, 1975:87).

Shade's Mills Conservation Area is a day use park on a wooded site of approximately 178 hectares (439 acres) located on Mill Creek at the eastern edge of Cambridge. Officially opened in 1972, the area's development for recreation began following completion of the Shade's Mills dam in early 1970. In summer, the area's 40 hectare reservoir affords opportunities for swimming, fishing and non-motorized boating, while the adjacent 35 hectare developed area accommodates picnicking, hiking, nature trails and sports activities.

Visitor use of Shade's Mills shows a decline over the last ten years, from 43,780 in 1978 to 33,166 in 1983 to 27,043 in 1988. The 1982 summer user survey indicated that the majority of

use is very local, from Cambridge residents living no more than 5 miles away (GRCA, 1983:6-10).

In addition to these large public recreation areas there are eight municipal parks in Cambridge along the banks of the Grand and Speed Rivers.

Water Sports

The section of the Grand River from Cambridge to Paris is the most popular for canoeing and kayaking. It is very scenic, as the river winds past high bluffs and wide floodplain areas. There are 5 public access points along this reach. Except for a 2 km stretch in Cambridge, this section of the river is too shallow for motorized boats, and their absence together with the long reach of continuous forest creates a near-wilderness atmosphere which is exceptional in such a rapidly developing area. There are also opportunities for non-motorized boating at Pinehurst Lake and Shade's Mills.

Nature/Scenic Appreciation

Outstanding opportunities for naturalist activities are associated with the natural values of the Grand River Forest described in the previous section.

Camping opportunities are provided at 6 private campgrounds near the river as well as at Pinehurst Lake, and there are additional picnicking facilities in most of the riverbank parks in Cambridge (Map 2).

Fishing and Hunting

Sport fish inhabiting warmwater and coolwater rivers and streams in the OMNR Cambridge District include largemouth and smallmouth bass, northern pike, walleye, yellow perch and panfish. Carp, white sucker and bullhead are the most common coarse fish. Bluntnose minnows, creek chub, common shiners, blacknose dace and fathead minnows provide forage for sportfish and are harvested commercially to provide bait for anglers. Relatively small spawning migrations of rainbow trout and Pacific salmon from Lake Erie occur in the Grand and Nith Rivers upstream to the Paris and New Hamburg dams respectively. Most fishing activity takes place on the Grand River or its major tributaries: the Nith, Conestogo and Speed Rivers (OMNR, 1989a:5).

In the Cambridge District as a whole, inland anglers spend 10,000 angler-days seeking resident trout in coldwater streams, while 78,000 angler-days are spent fishing in warmwater streams, rivers, lakes and reservoirs. (Angling activity in stocked trout ponds or fishing preserves has not been included in these figures.) Most of this effort is from Ontario residents local to the area (OMNR, 1989a:6-8).

The estimated current sport fish harvest from inland coldwater fisheries is 2,000 kg/yr, while inland warmwater fisheries yield 39,000 kg/yr. By the year 2000 the level of sport fishing activity is expected to increase by 15%, based on an estimated population increase of about 1% per year (OMNR, 1989a:8).

Rivers in the Grand River watershed--the Grand, Nith, Conestogo and Speed, as well as some smaller streams--provide excellent opportunities to catch bass, pike, perch, panfish and, in some cases, walleye. Because most of these rivers flow through or near large urban centres, they have the potential to provide convenient recreation opportunities for most residents of the area. The estimated potential sport fish yield from these rivers is considerably higher than both the current and the projected use for this type of fishing.

Although this appears to indicate that the resource is presently being underutilized, this is probably only true for panfish and coarse fish species (i.e. sunfish, crappies, suckers, carp, bullhead). At some locations, preferred species (bass, pike, walleye) may be utilized at or over current production levels due to habitat degradation and localized heavy angling pressure (OMNR, 1989a:30).

Management by OMNR of warmwater and coolwater rivers and streams will emphasize strategies that will maximize production and utilization of preferred species through habitat protection, creation and rehabilitation, range expansion, access improvement and public education. At the same time, emphasis will be placed on increasing utilization of panfish and coarse fish species through promotion and enhancement of angling opportunities. An additional management strategy addresses the considerable interest which has been expressed by individuals, angling clubs and municipalities in establishing a major spring and fall migratory salmonid fishery in the Grand River upstream to the City of Cambridge (Ibid.).

Hunting is permitted in several public recreation areas managed by OMNR within the boundaries of the Cambridge to Paris study area (Map 2), mainly for white-tailed deer but also some small game and waterfowl. No statistics are available for hunting activity on these lands, nor the many privately owned lands where hunting may occur.

Trails and Corridors

The Grand Valley Trail bypasses the City of Cambridge and runs across country from the south end of Kitchener down to Paris. From Glen Morris to Paris it follows the edge of the river almost continuously, except for a short section along the nearest road. It winds through the forest from the tops of the bluffs down to the water's edge, and provides excellent views of this very scenic section of the river. In Paris the trail follows the main street closest to the river through the old part of town, and is congruent with much of the historic walking tour promoted by Paris Heritage, the local LACAC, which features the best examples of the town's architectural heritage, particularly cobblestone buildings.

The East River Road and West River Road follow the banks of the Grand quite closely between Cambridge and Paris, offering several very scenic lookouts across the river from high bluffs. The West River Road follows an old Six Nations Indian footpath. This route makes a very pleasant scenic drive, and part of it is featured as a suggested driving tour of Waterloo Region and area (Waterloo Regional Heritage Foundation, 1986). The addition of a paved shoulder or bicycle lane would make it an attractive cycling route as well, as in fact it used to be; in 1889 the Galt Bicyclists made a cinder path beside the East and West River Roads (Taylor, 1967:182).

Another important corridor between Cambridge and Paris is the Lake Erie & Northern railway line on the east side of the river, which is currently owned by Canadian Pacific and scheduled for abandonment in the near future. Many people would like to see this right of way available for public use as a hiking trail; it would also be suitable for equestrian and bicycle use. The Brampton-based Ontario Locomotive and Car Company has put forward a proposal for a scenic railway along the section of track between Paris and Glen Morris, and is currently in the process of applying for the necessary permits.

Access roads and trails through the Agreement Forests and public recreation areas managed by OMNR are also open to the public and are used for hiking, horseback riding, and cross-country skiing (Map 2). During the winter season, 9 km of marked and groomed cross-country ski trails are maintained at Pinhurst Lake and an additional 14 km at Shade's Mills, as well as winter walking trails.

Human Heritage Appreciation

Many special human heritage features are associated with the river in Cambridge and Paris: a variety of limestone, granite and cobblestone buildings erected by the groups who settled there, and industrial heritage structures such as flour and textile mills, foundries and factories. Heritage Cambridge and Heritage Paris, the local LACACs, have produced brochures describing historical walking tours. In Cambridge, development since the 1974 flood has focused on accessibility to the river, with parks and walkways along the banks through the centre of the city. Within several park areas remains of historic buildings have been incorporated into the design; for example, at Mill Race Park concerts are held in an amphitheatre set in the ruins of an old textile mill.

The annual Riverfest celebrations take place along the banks of the river in Cambridge and include exhibits, entertainment and demonstrations all around and on the water. The Cambridge Highland Games are an annual event featuring dance competitions, pipe bands and entertainment in the Scottish tradition.

DUNNVILLE AREA

The Grand River valley in this region has great significance for recreation. It is perhaps the richest of any of the natural resources in the region with respect to recreational potential and variety of experiences. Existing recreational facilities in the region indicate that recreation has not been developed to anywhere near its potential (Leach and Sandilands, 1977a:2).

Natural Values

The lower Grand River supports a system of wetland plant communities that extend discontinuously from just south of Cayuga to Lake Erie; the marshes in the lower reaches in the vicinity of Dunnville are essentially continuous to the mouth of the river. The entire system constitutes the largest wetland along the north shore of Lake Erie east of Long Point and virtually all of the individual blocks of marshes, wet meadows, thickets and swamps that comprise the system are rated as Class 1 wetlands. This rating is based to a large degree on fish and wildlife habitat values (Hough et al., 1987:21).

The lower Grand is a warm water system dominated by such fish species as carp, bullhead, channel catfish and members of the sucker family (OMNR, 1989:6). A total of 54 species of fish have been identified in the lower Grand, but it is clear from sport and commercial fish harvest data that the composition is not uniform throughout. The river below the Dunnville weir has a distinctly higher diversity and apparently greater production than above. The lower reach may not have an inherently greater production, but apparently does produce more fish because there is free exchange in fish populations between this section of the Grand River and Lake Erie. Consequently, this reach consistently contains lake species that augment fish produced solely by the river (Hough et al., 1987:24). The physical water quality and nutrients found in the lower Grand are suitable if not almost ideal for the production of yellow walleye, a prized sport fish tolerant of a wide range of environmental conditions (Ecologistics Ltd., 1982b:17-18). The lower Grand in general has been regarded as the most significant warm water fishery in the Region of Haldimand-Norfolk (Chanasyk, 1970). The marshes along the Grand, particularly the Dunnville marshes, are considered to provide excellent spawning, nursery and forage habitats for a variety of fish species. These populations provide an important base for local and regional sport fishing as well as some commercial enterprises.

In addition to the fisheries resource, the lower Grand is a varied and productive habitat for aquatic and marsh associated wildlife species. It is significant for its waterfowl production and as a waterfowl staging area. The species that occur here are primarily dabbling ducks such as mallard, blue-winged teal, black duck and scaup. Apart from waterfowl, the marshes support large populations of avifaunal species and mammals, particularly furbearers.

Recreation Opportunities

The two main public areas designated for recreational use are Byng Island Conservation Area in Dunnville and Rock Point Provincial Park adjacent to the mouth of the river on Lake Erie.

Byng Island Conservation Area, 469 acres in size, was acquired in 1958 to provide recreational facilities in the southern portion of the watershed, to protect the natural and historical features of the area, and to prevent development on the floodplain, as well as to manage water levels in the Dunnville reservoir. The area owes most of its attractiveness to the two islands in the northern portion, and to Sulphur Creek which separates them from the mainland. The islands are linked to each other and the mainland by weirs with walkways. These offer excellent views of the Grand River, Sulphur Creek and the mainland. The mainland part of the area is relatively flat, thus making it especially suitable for picnicking and camping. The islands are heavily wooded with mature oak and hickory, the eastern portion of which forms an attractive habitat for wildlife and provides interesting opportunities for nature study (Leach and Sandilands, 1977a:28).

Rock Point Provincial Park is a 188 hectare recreation class park located 11 kilometres southeast of Dunnville on the Lake Erie shore. It offers opportunities for swimming, camping, picnicking and nature appreciation, particularly viewing Devonian fossils and birdwatching. The middle Devonian Onondaga limestone (Edgecliff member) outcrops at Rock Point, appearing as highly fossiliferous chert-rich beds. Rock Point is also one of the best locations along the eastern Lake Erie shoreline to observe bird populations. Both migratory waterfowl and shorebirds are attracted to the point, and the park is one of the few locations in Ontario where the rock or purple sandpiper has been seen (OMNR, 1988). Visitors to the park in 1987 totalled 42,816; the July-August occupancy rate was 68% of capacity.

Several municipal parks are located in Dunnville, the most noteworthy of which is William Wingfield Park on the riverbank in the centre of town, where boat tours are available to the public. Public access to the river is also provided by a waterfront park in Cayuga. In addition to these facilities, there are 10 private campgrounds and 4 marinas in the study area (Map 3).

Water Sports

Boating is a very popular activity in this area. The river is wide and deep enough to accommodate extensive use by power boats, and water skiing is also prevalent. At present boating activity is separated into two sections by the Dunnville weir. Above the weir, boats of up to 14 or 16 feet can use the river as far as Cayuga, at which point it becomes too shallow. Below the weir the river is open to Lake Erie, and can accommodate larger boats such as cabin cruisers as well as sailboats. The total use of the river for boating from Cayuga to Lake Erie has been estimated by compiling information from local informants on the peak numbers of boats likely to access the river from each location, and amounts to 28,372 occasions per season. The economic value of this activity is estimated at \$823,249.00 (Hough et al., 1977:28-32). There is a small but steady component of touring boaters who come in from other ports, primarily American, and stay for one or more nights.

Since the mid 1970s the Town of Dunnville has been interested in developing improved recreational boating access and facilities to attract boaters currently deterred from using the Grand due to the presence of the Dunnville weir. Other municipalities, tourism and economic development groups have also expressed interest in seeing the upper Grand further opened to recreational boating, not only in the Dunnville area but also Cayuga, Caledonia, and eventually Brantford (Hough et al., 1977:4). If this extended development were to include restoration of the locks and weirs constructed by the Grand River Navigation Company in the 1830s, this would add a very significant historical dimension to recreational boating on the Grand. A study completed in 1987 recommended construction of a lift lock at the western end of the Dunnville weir, and projected that substantial benefits would accrue to the local community in the form of a 225% increase in the transient tourism market with associated increases in income and employment. The study also recommended additional marina construction and considerable redevelopment of the waterfront area in Dunnville to link the mooring area with the commercial district (Hough et al., 1987). Funding has now been secured for the project, and the Regional Municipality of Haldimand-Norfolk has initiated a Tourism and Development Study along the river corridor from Cayuga to Lake Erie. An Environmental Impact Assessment is also being conducted on the lift lock construction proposal, to investigate the effects it may have on the valuable wetlands adjacent to it. Since these wetlands constitute the natural resource base upon which many of the recreation opportunities depend, it is very important that any potentially negative impacts be identified prior to construction.

Canoeing and sailing opportunities also are available on this section of the river, although these activities are not as popular as motorized boating. Canoeing is an excellent way to access the marshes and view wildlife. Swimming opportunities in the river are best along the east side where access is easier and there are fewer marshy areas; there is also a two-acre swimming lake at Byng Island Conservation Area. The best public swimming opportunities in this area are provided by the Lake Erie beachfront at Rock Point Provincial Park.

Nature/Scenic Appreciation

The abundant wildlife in the Dunnville marshes offers excellent opportunities for naturalist activities, especially birdwatching. The potential in this respect has not been developed; there is no local naturalist club and it is likely that many people are deterred from watching fall migrations because of the waterfowl hunting which occurs in the area.

There are numerous camping and picnicking opportunities in the public and private parks along the river valley (Map 3). In 1988 Byng Island Conservation area was the third most heavily used of the 13 active conservation areas. Use statistics for Byng Island selected at five year intervals are as follows:

<i>Year</i>	<i>Camping</i>	<i>Day Use</i>	<i>Total</i>
1978	29,720	47,196	76,916
1983	49,988	24,867	74,855
1988	61,477	37,572	99,049

Fishing and Hunting

The Grand River is the OMNR Niagara District's most important inland warm water fishery. The current sport fish harvest is estimated at 14,300 kg per year, which is expected to increase by about 10% to 15,700 kg per year by the year 2000 based on forecasted human population increases (OMNR, 1989b:7-10). Six commercial fishermen operated nets in the Grand in 1987; 99% of the harvest of 15,200 kg consisted of such species as common carp, bullhead and channel catfish.

Although the river below the Dunnville weir has a greater diversity of fish species as well as a higher catch per unit effort and total harvest than the section above the weir, the latter is more heavily fished. Data from the 1983-84 OMNR creel census estimated mean angler hours on the lower Grand (below the weir) at 34,445; the comparable figure for the stretch of river from Dunnville to Caledonia is 68,892.

The most recent data available on angler origins are from the 1983-84 OMNR creel census. On the lower river from Port Maitland to the Dunnville weir it was estimated that 35% of the anglers were local residents (Niagara District), 54.4% were non-local (Ontario residents outside the Niagara District), and 10.6% were non-residents. From Dunnville to Caledonia the figures were 35.5% local, 62.1% non-local, and only 2.4% non-resident.

The OMNR sport fisheries management objective for the Grand River is to provide a harvest of 15,700 kg and supply 32,700 angler days per year by the year 2000. Emphasis will be on habitat protection and providing anglers with a desirable fish species community. Specific management strategies include continuation of efforts to resolve fish migration problems caused by Grand River weirs by supporting sportsmen's efforts with the Community Fisheries Involvement Program walleye hatchery, determining the compatibility of Thames River walleye stocks with Grand River stocks, and developing means of ensuring fish passage past the weirs while excluding sea lamprey if required. The Ministry will also encourage municipalities and the private sector to maintain and improve public access to the resources (OMNR, 1989b:21-25).

Waterfowl hunting in the Dunnville marshes is a popular activity during the fall (late September to mid December) for local residents as well as a limited number of non-locals. The Grand River marshes provide habitat attractive to nesting and migrating puddle ducks. The large numbers of puddlers, some of which are summer residents, dwindle by the midpoint of the hunting season as the ducks move to their wintering grounds in the south, and this is reflected in a decrease in hunting effort as the season progresses. In a mail survey conducted by OMNR in 1979, 33 hunters reported hunting the Grand River marshes for a total of 153 days, harvesting 389 waterfowl. Of 18 species hunted, the major portion of the kill consisted of teal, mallard, wood duck, scaup, black duck and widgeon (Lewies et al., 1982). Hunting effort is not evenly distributed throughout the wetland system. The marshes below the dam, which are largely privately owned, appear to be the most heavily used, while areas above the weir are hunted more sporadically. Local gun clubs lease sections of the marshes for this purpose. Hunting is prohibited in areas within the limits of the Town of Dunnville and restricted by OMNR regulations in other nearby built-up areas (Hough et al., 1977:39).

No public deer hunting areas are located along the lower Grand; landowner permission is required. A deer survey conducted by OMNR in February 1989 indicated that deer are present in 100% of the woodlots over 200 ha. Particularly significant concentrations of deer were found in the Young Tract northeast of Cayuga and in two large woodlots north and south of Dunnville.

Trails and Corridors

The Grand Valley Trail was extended in 1987 from Brantford to Lake Erie. Starting in Rock Point Provincial Park, it follows the tow path of the old canal on the east side of the river to Dunnville, where it crosses the river and follows the roads nearest the river up to Cayuga (Map 3). This route is interesting historically because it uses the old tow path, and also provides many scenic views of the river. Since most of the trail is on or close to rural roads in this section, the route could also be considered an auto and/or cycling tour, although it is not advertised as such. The Ontario *Traveller's Encyclopaedia* features the Talbot Trail along the Lake Erie shore and Highway 3 as a Heritage Highway, but does not suggest any tours which focus on the Grand River.

Human Heritage Appreciation

The importance of boating and fishing in the Dunnville area is reflected in the themes of the local festivals. Annual events include the Flotilla between Cayuga and Dunnville, Cayugafest, and the Mudcat Festival and Thunder on the Grand (power boat racing) in Dunnville.

The potential exists for restoration and interpretation of at least part of the system of locks and canals constructed by the Grand River Navigation Company in the 1830s. Many remains are still visible along the east bank of the river, providing an important link with the past and illustrating the settlement history of this area.

CONSTRAINTS

Water Sports

Water-based recreation does not take place in isolation from the land, and adequate public access to the water is essential for the realization of these recreation opportunities. The growing population and industrial and residential development, particularly in the central part of the watershed, leads to rising property values and incentives for high density residential development of waterfront property, making it difficult for the public or the private sector to afford acquisition of land for low density open space and recreational uses.

A number of private landowners have reported problems with trespass, garbage and vandalism, especially in areas where they own low-lying land along the riverbank which affords convenient landing points for boaters. This seems to occur most frequently along the Cambridge to Paris stretch, which is the most popular section for canoeing.

Construction of a lift lock at Dunnville will bring many more boaters to the lower river between Cayuga and Lake Erie. As highlighted in the *Haldimand-Norfolk Tourism Strategy* (Economic Planning Group of Canada, 1988), the existing support facilities for boating are inadequate to meet the projected demand.

A further constraint pertains to conflicts among different recreational activities occurring at the same place and time. In the case of water sports the main issue is power boating versus non-motorized boating and, to some extent, swimming, especially in the lower river.

Finally, the question of carrying capacity must be considered in development of recreation opportunities. Construction of support facilities and/or excessive use in certain areas may result in negative impacts on the natural resources which provide the basis for these opportunities.

Nature/Scenic Appreciation

In general, the constraints associated with these activities parallel those described above for water sports: limited public access to land along the riverbank in many parts of the watershed, coupled with increasing demands upon the land base from industrial and residential development; conflicts among uses; and, in some areas, concentrated use resulting in negative impacts on the natural resources.

Fishing and Hunting

There is general agreement among fisheries managers and the public that loss of fish habitat and environmental quality is the most serious problem facing management of all fisheries in the OMNR Cambridge District. This problem is due mainly to agriculture and urbanization. Deforestation, poor farming practices, urban development, dam and pond construction, channelization and draining of wetlands are the main contributing activities (OMNR, 1989a:10).

Another issue in the Cambridge District is demand vs. supply of angling opportunities. The present demand for preferred sport fish species (resident brook and brown trout, largemouth and smallmouth bass, walleye and northern pike) is so high that some of the more popular fishing areas are being overfished. At the same time, other water bodies containing less desirable fish species are underutilized by anglers. This problem is compounded by other fisheries issues. Habitat loss and the posting of private land has increased competition for what remains. Traditional angler attitudes result in readily available panfish and coarse fish populations being overlooked in favour of less available game fish stocks (Ibid.).

Water quality in the lower reaches of the Grand River is capable of sustaining numerous fish species and waterfowl. However, some water quality degradation has induced tumours on some fish specimens (Lewies, pers. comm.). Also, the presence of high concentrations of some metals may affect the local fish and waterfowl population (Ecologistics Ltd., 1982b:21).

The Ontario Ministry of Environment (OMOE), in conjunction with OMNR, has identified consumptive guidelines for sport fish. Of the fish sampled within the Grand River basin, some restrictions have been placed on the consumption of smallmouth bass, northern pike, carp, coho and redhorse sucker in the Kitchener, Blair, Caledonia-Dunnville and Dunnville-Port Maitland areas (OMOE and OMNR, 1989:24-25). No consumption of walleye over 65 centimetres long caught in the Caledonia-Dunnville and Dunnville-Port Maitland areas should occur due to high mercury levels in the fish (Ibid.). However, improvements in water quality may eventually allow the edibility of previously contaminated fish (OMOE and OMNR, 1989:9).

Although it does not inhibit the upstream movement of salmonids, the volume of water at Dunnville presents a physical barrier to walleye. This may be rectified by the use of fish ladders; however, they have generally not proven successful in passing warm water fish species (Ecologistics Ltd., 1982b:20-21).

Trails and Corridors

There seems to be a lack of support in rural communities for abandoned rail lines to be converted to pedestrian or equestrian trails. Two cases in point are the recent loss of the Branchton line and the controversy over the imminent abandonment of the Canadian Pacific line between Cambridge and Brantford.

The main constraint on major trails is loss of route access due to changing land use practices, especially near urban centres. As all trails are managed by non-government groups and pass over private lands with the permission of individual landowners, the trail routes are insecure in most cases. Only where trail routes pass over public lands may they be secured. Even then, major trails in most political jurisdictions are not included in official regional or municipal plans. No formal management plans exist for any of the trails in the Grand River valley (Hart, 1989:190).

Human Heritage Appreciation

The value of human heritage resources is recognized unevenly in the Grand River valley. While some communities have taken steps to preserve their historic buildings and enhance public appreciation of them, others have permitted the demolition of historic structures rather than encouraging restoration or renovation.

PLANNING

Much planning is already being done in the Grand River valley by agencies and organizations at various levels. There is no need to reinvent the wheel, but rather to seek ways to build upon and improve the effectiveness of the existing system. The following points are made from that perspective.

1. The demand for public open space along the banks of the river and public access to the water is going to increase in the future, and resources must be directed to meeting this demand. Municipalities in the watershed, even those which have not traditionally been strongly oriented to the river, are taking steps to designate riverbank parks and open space, but the increasingly high market value of waterfront property results in considerable pressure for construction on these lands. Better recognition must be given to the value of open space along the river in its own right, for ecological, social and aesthetic reasons. In rural areas most riverbank property is privately owned and there are very few public access points. Many places in the valley have been identified as suitable for the development of scenic lookouts, picnic areas, boating access points and the like, but relatively little action has been taken. More public landing areas would likely reduce the trespass problems now experienced by private landowners.

2. Many of the existing open spaces, particularly canoe access points and rural roadside stops, would benefit from upgrading in the form of additional parking, sanitary facilities, garbage collection, and better signage.

3. A more integrated and firmly established system is needed to link open spaces along the length of the watershed, both physically and perceptually. At the local level municipal trail systems may meet this need, but within the watershed as a whole there are many discontinuities. The Grand Valley Trail is the best regional link at present but, as noted earlier in this report, most of the route is not secured in any formal way. Perceptual links in the form of interpretive signs and published information about the natural and human heritage of the Grand could do much to raise public awareness and appreciation of the resources. The GRCA has already developed a great deal of related material for its conservation education programs; the scope of these activities could be expanded.

4. Economic benefits from recreation opportunities may be realized through more vigorous and co-ordinated promotion of tourism in the Grand River valley. Many events, festivals, historic sites, facilities, etc. are advertised individually or through a municipality, but these initiatives depend on the jurisdiction concerned and are uneven on a watershed basis. The potential exists to market the attractions and recreation opportunities in the valley as a package.

5. In order to make the most of the tourism potential afforded by the recreation opportunities in the valley, a much better understanding is needed of the existing recreation and tourism patterns, the market area, and the capacity and level of use of existing facilities, as well as estimates of future demand for various activities. Little research has been done in this area in the last decade, and the existing information needs to be updated.

6. In the construction and renovation of recreation facilities, accessibility for the disabled should be incorporated into the design as much as possible. Many area municipalities are making a commendable effort in this regard, and the GRCA also has a policy to this effect for its conservation areas and nature centres.

7. Valuable human and natural heritage resources exist in the Six Nations/New Credit Reserve and the associated historic sites in the Brantford area. Little mention has been made of them in this report because the native people chose not to participate in the study. However it must be recognized that great potential exists for development of native themes if the situation changes in future.

8. There is a role for a basin-wide co-ordinating body for planning and development of recreation and tourism opportunities linked to natural and human heritage resources. A possible agency in this regard is the Grand River Conservation Authority.

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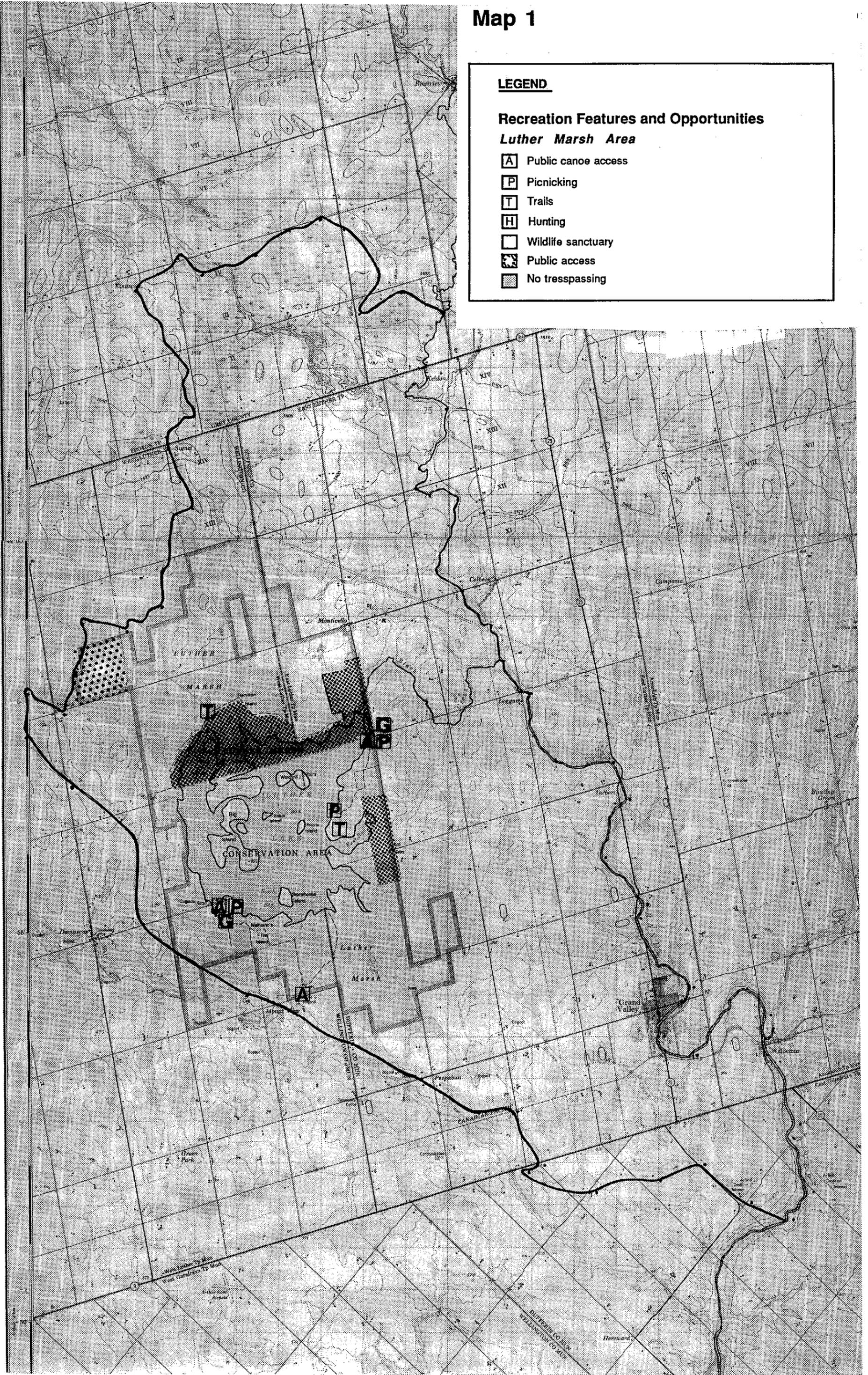
Map 1

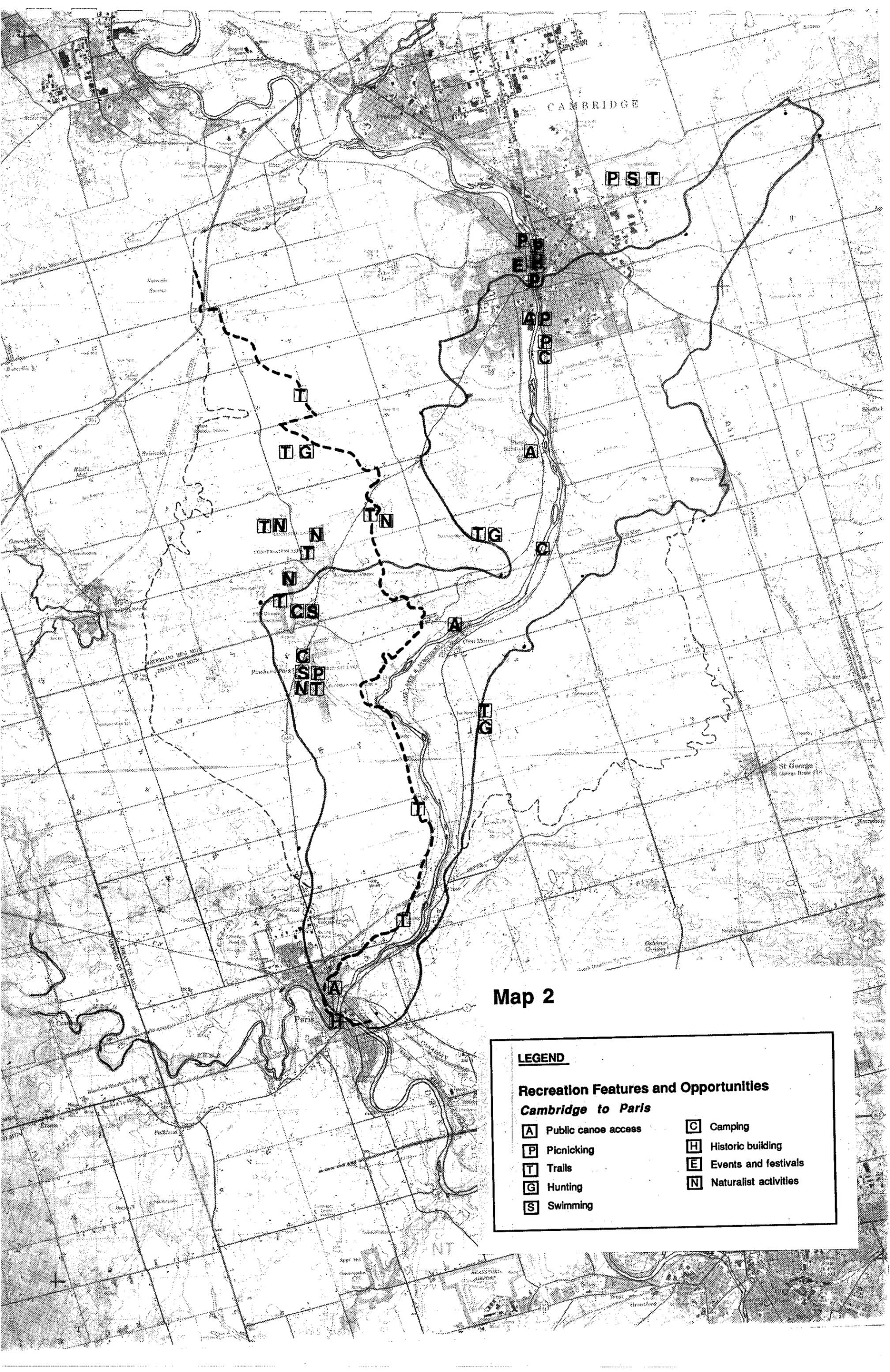
LEGEND

Recreation Features and Opportunities

Luther Marsh Area

- A** Public canoe access
- P** Picnicking
- T** Trails
- H** Hunting
- ☐ Wildlife sanctuary
- ▨ Public access
- ▩ No trespassing



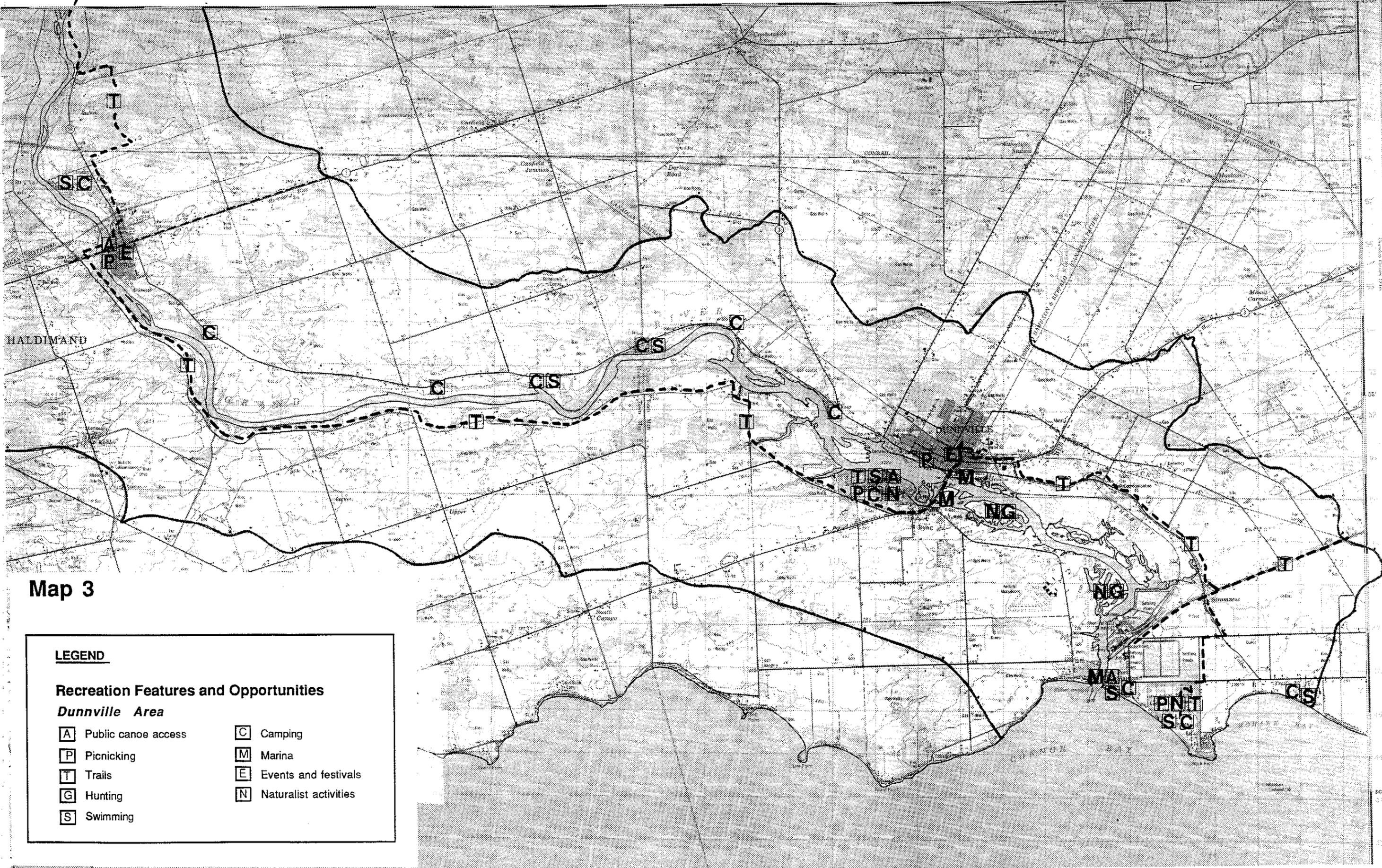


Map 2

LEGEND

Recreation Features and Opportunities
Cambridge to Paris

A Public canoe access	C Camping
P Picnicking	H Historic building
T Trails	E Events and festivals
G Hunting	N Naturalist activities
S Swimming	



Map 3

LEGEND

Recreation Features and Opportunities

Dunnville Area

- | | |
|------------------------------|--------------------------------|
| A Public canoe access | C Camping |
| P Picnicking | M Marina |
| T Trails | E Events and festivals |
| G Hunting | N Naturalist activities |
| S Swimming | |

Aggregate Resources in the Grand River Valley

Doug Baker

CONTEXT

Introduction

The purpose of this report is to examine the significance of mineral aggregate resources to heritage planning in the Grand River Valley. The distribution of aggregate resources is studied within three selected nodes of the Grand River Valley: Luther Marsh, Cambridge-Paris, and Dunnville. Aggregate resources are part of a diverse and complex resource base, and as such, must be planned in relation to other resource uses. The mining of sand, gravel, and bedrock deposits is essential for the economic development of an area; however, the indiscriminate extraction of aggregate resources may pose a threat to the cultural and natural heritage of the Grand River valley. The significance and constraints of developing aggregate sources in relation to identified heritage resources is an important step to recognizing potential land use conflicts in the future.

Aggregate Resources

Aggregate resources are used for bulk construction purposes and constitute the primary material for highway construction and concrete production. Natural aggregate sources are non-renewable resources that are most commonly extracted from sand and gravel deposits and bedrock. Large amounts of material are extracted each year for aggregate use. In Ontario, 165 million tonnes were produced in 1986, for a value of \$703 million (Ontario Ministry of Natural Resources, 1988).

Most resources used for aggregates share the common characteristics of physical suitability for the product and sufficient volume to warrant mining. A good aggregate must be able to resist excessively large or permanent changes in volume when subjected to destructive agencies, such as heavy traffic or freeze-thaw action. A general purpose aggregate is required to be: stable against breakdown in use or in stockpile; non-plastic; chemically inert; durable; and strong enough to withstand loading applied in use, whether tensile or compressive. As well, because aggregates are usually used for bulk construction purposes, the source needs to contain a relatively large volume of material to satisfy construction needs.

Aggregate sources can generally be divided into two categories, artificial and natural. For the purposes of this study the discussion will be restricted to natural resources. Natural aggregates are derived from bedrock and unconsolidated sediments, such as sand and gravel.

1. *Bedrock sources*

Bedrock sources are quarried or mined from accessible outcrop deposits. Vertical faces are cut back to expose unweathered material, and the rock that is suitable for aggregate production is drilled and blasted from the face. The quality of the rock is determined by its mineralogical characteristics, strain cracks, fracture patterns, bedding planes, and zones of unsound material. The joint and bedding plane systems are especially important because they indicate the sizes of blocks which probably will be produced in quarrying.

The quality of suitable bedrock for quarrying purposes varies throughout the Grand River basin. The primary sources of bedrock for crushed stone are derived from limestone and dolostone of Devonian and Silurian age. The Dunnville node is the most reliant on bedrock resources due to a lack of suitable sand and gravel deposits.

2. *Sand and gravel deposits*

The most common unconsolidated sediments used for aggregate production consist of sand and gravel. The physiography and distribution of the sediments are a result of glaciation during the Late Wisconsin Substage of the Pleistocene Epoch (Chapman and Putnam, 1966). The maximum glacial advance occurred approximately 18,000 years ago. The advance of the ice sheet and subsequent recession deposited a variety of outwash and till deposits. Water melting from the ice created outwash channels and deposited large amounts of sand and gravel in bed and terrace formations. Sediment-laden meltwater flowing at the base of the glacier formed eskers and ice-contact drift deposits. Outwash and ice-contact material tend to provide the best material for the production of aggregates because the deposits are moderately well sorted, have a low silt content, and are usually durable.

Aggregate Use

Aggregate resources are required for a wide variety of uses within the construction industry. The largest quantities of aggregates are used for highway construction, fill purposes, and concrete production. From a regional perspective, residential construction forms an important part of the demand market. Individual home construction provides a need for approximately 300 tonnes of aggregate per unit (Canadian Minerals Yearbook, 1987). It is significant to note that the city of Cambridge is in the midst of a building boom. Building permits for new homes, schools, industries, and commercial projects worth \$119 million were issued during the first 6 months of 1989 (*Globe and Mail*, August 5, 1989). This is almost double the permits issued last year, and the increase in construction imposes a significant demand on available aggregate resources.

Not all sand, gravel, and bedrock deposits are suitable to use for aggregate production. The suitability of an aggregate resource for commercial extraction is measured by engineering criteria that set specifications for a product to ensure the product will perform satisfactorily. These criteria establish allowable tolerances of gradation, soundness, durability, chemical stability, and other test parameters. Specifications for quality vary according to the different uses for the aggregate; an aggregate product that will be exposed to considerable stress, such as road surfacing, will have more rigid specifications than material used for fill purposes. Many deposits that have a high silt content or poor soundness are not feasible to use for aggregate production.

Production

The primary demand for aggregates comes from the construction industry. The quantity of material used is closely related to the amount of activity in construction. The unit price of aggregates fluctuates from region to region, with no provincial "standard price". Prices are determined on a local basis depending on factors that affect supply such as: cost of extraction, the amount of processing required, transportation costs, the type of product, or economies of scale (the size of the operation). The high cost of transportation for aggregate materials requires producers to have their source of supply as near the demand as possible in order to be competitive. The bulk density of mineral aggregates makes transportation to market sources expensive, accounting for approximately one half of the delivered price (Canadian Transport Commission, 1978). A study conducted for the Ontario Ministry of Natural Resources in 1980 (Peat, Marwick and Partners and M.M. Dillon Ltd.) revealed that trucking costs for hauling aggregates beyond an approximate distance of 30 kilometres doubled the delivered price of the product. Development of sources close to the demand market can considerably reduce the delivered price of the aggregate and increase an operator's competitive edge.

Regulation

The regulation of sand, gravel, and bedrock resources is presently controlled by the *Pits and Quarries Control Act*, the *Beach Protection Act*, and Part 7 of the *Mining Act*. Bill 170 or the *Aggregate Resources Act*, which has received Royal Assent and awaits Proclamation, will supercede these acts and amalgamate control under one act. The Ontario Ministry of Natural Resources administers the *Aggregate Resources Act* in conjunction with the Mineral Aggregate Resources Policy Statement. The Statement provides direction to the province and municipalities for the planning of aggregate resource extraction.

Municipal control of aggregate resources is provided in the *Planning Act* and the *Municipal Act* through zoning by-laws. Municipalities cannot regulate established pits and quarries through zoning by-laws; however, they can attempt to control the establishment of new sources, and regulate traffic, dust, and noise control. In the event that municipal by-laws or the Official Plan conflict with the *Aggregate Resources Act*, the *Act* takes precedence and the municipal regulations are inoperative to the extent that they conflict with the *Act* (Sect. 66: 1-4). A Class "A" license (to excavate annually more than 20,000 tonnes) or a Class "B" license (less than 20,000 tonnes) is required for aggregate extraction. An annual fee is payable for the operation of a pit or quarry and is subject to inspection by the Ontario Ministry of Natural Resources. A production fee of 6 cents per tonne of aggregate is levied against the operator, and the benefits are distributed as follows: 4 cents to local municipalities, 1 cent to the province, 1/2 cent to counties/regions, and 1/2 cent to the Abandoned Pit and Quarry Rehabilitation Fund.

An Environmental Impact Statement is not a prerequisite to the granting of a license. However, every application for a license is circulated internally to the Ontario Ministry of Natural Resources and externally to conservation authorities, municipalities, the public, and other concerned agencies. An impact assessment can be requested in those areas considered environmentally sensitive.

PATTERNS

The aggregate resources are mapped (Maps 1, 2 and 3) for the three nodes of Luther Marsh, Cambridge-Paris, and Dunnville according to Ontario Ministry of Natural Resources classifications for sand, gravel, and bedrock deposits. The mapping data is derived from

Aggregate Resources Inventory Papers (ARIP) produced by the Ontario Ministry of Natural Resources and the Ministry of Northern Affairs and Mines. Updated information for licensed deposits was obtained from the Cambridge office of the Ontario Ministry of Natural Resources. Within the time and mapping constraints of this study the following characteristics are mapped:

1. *Selected Sand and Gravel Resource Areas of Primary and Secondary Significance*

The sand and gravel deposits of primary and secondary significance are evaluated by 2 sets of criteria. The first set of criteria is based on site-specific characteristics that relate to features of individual deposits: deposit size, aggregate quality, and location. The deposit size should contain enough material to support a commercial operation; for example, deposits ranked as Class 1 are thicker than 6 metres and contain more than 35% crushable gravel. The aggregate quality is an important factor that determines the potential commercial applications for which it can be used. The location of the deposit relates to the physical constraints on the resource, such as overburden or groundwater, and the human features that affect aggregate extraction. Power lines, roads, or housing may be constructed on a deposit and restrict any future extraction. The second set of criteria involves the "assessment of local resources in relation to the quality, quantity, and distribution of resources within the region in which the report is located" (ARIP). Further detail of selection criteria are described in the *Aggregate Resources Inventory Paper* for each township. The resource areas of primary significance are considered to be the most valuable deposits to the municipality for aggregate extraction. Each deposit is given a number to rank its relative importance for development according to the preceding sets of criteria. The primary deposits are ranked for each township within the study node, causing there to be more than 1 deposit within the node to have the same ranking. For example, in the Cambridge-Paris node there are 2 deposits with the same #1 ranking, one for the Township of North Dumfries and one for the Township of South Dumfries.

Deposits that are designated as secondary in significance contain suitable amounts of material for aggregate development. These deposits are not considered as valuable as primary deposits for reasons of the above criteria: for example, the deposit may be further away from market sources or have a poorer quality petrographic content. The sand and gravel resources of secondary significance are not ranked.

2. *Selected Bedrock Resource Areas*

The selection of bedrock resource areas is based on criteria similar to those used for sand and gravel. The bedrock deposits are ranked according to the area best suited for development.

3. *Licensed Pits and Quarries*

The boundaries are illustrated for properties licensed with the Ontario Ministry of Natural Resources for the extraction of sand, gravel, and bedrock.

4. *Unlicensed Pits and Quarries*

Within this category are included abandoned pits and quarries, and wayside pits and quarries that are operating on demand under authority of a permit from the Ontario Ministry of Natural Resources for aggregate extraction. Wayside pits are operated on an interim basis, usually for road construction, and require a permit each time aggregate is extracted for construction purposes.

Luther Marsh

Aggregate resources within this node are relatively scarce. Outwash, esker, and ice contact deposits provide sources for gravel pits around the boundary of the node. The major resources of primary significance consist of outwash terraces along the Grand River, north and south of Grand Valley. Within the Township of East Luther, this deposit is ranked #1 and #2 in order of importance for aggregate extraction. There are presently 3 licensed properties around Grand Valley established in this resource deposit.

In the Township of West Luther, the #1 ranked primary deposit is located south of Luther Marsh and contains 1 licensed property. The main source of aggregate in this area is derived from sparse esker deposits along the southern and western margins of the Luther Marsh area. In the northern section of the node, a large esker-outwash deposit provides the primary aggregate resource for Proton Township.

Cambridge-Paris

A large series of outwash deposits of primary significance are located on the west side of the Grand River between Cambridge and Paris. The primary resource area occupies at least one-half of the node area on the west side of the river. In the Township of North Dumfries, the primary deposit that is ranked #1 is presently occupied by 7 licensed properties. Similarly, in South Dumfries, the highest-ranked deposit is licensed by 3 large properties just north of Paris.

The availability of aggregate deposits on the east side of the Grand River appears insignificant compared to the west side resources. However, a considerable amount of material of primary importance is located east and north of Paris. Small deposits of secondary significance are also scattered in the eastern half of the node.

Bedrock resources are located approximately 2 kilometres east of Littles Corners, but presently there are no quarries established to mine this source.

Dunnville

Gravel deposits suitable for quality aggregate production are in short supply within the Dunnville node. There are no deposits of primary significance. A series of sand dunes in the southeastern corner of the node are selected at a secondary level of significance. The sand and gravel deposits within the dune formations are suitable for producing a restricted range of low specification products, such as blending sand or granular borrow (ARIP, Dunnville, p.10). Four licensed properties are established within the sand deposits.

Due to the low quality of the available sand and gravel deposits, Dunnville and Haldimand rely on bedrock quarries and importing of aggregates for quality material. For local quality aggregate sources, two bedrock resource areas are identified: south of Dunnville, and southwest of Cayuga. Each of these bedrock formations is divided into resource areas, based on the quality and accessibility of the rock.

SIGNIFICANCE

Luther Marsh

The present location of the wayside pits and licensed properties indicates the significant resources within the node area. The aggregate resources that are available are being developed. This node does not have substantial primary deposits or bedrock reserves. The significant aggregate resources within the node are those that have been previously described as of "primary significance":

1. the outwash terraces along the Grand River, in the vicinity of Grand Valley;
2. the esker deposit south of Luther Marsh; and
3. the esker-outwash complex in Proton Township, located in the northern portion of the node.

Cambridge-Paris

The two deposits that are ranked as #1 sources of primary significance, just south of Cambridge and north of Paris, are presently under pressure for development. For example, in the Township of North Dumfries in 1988, over 2.6 million tonnes of aggregate were produced from licensed sources (Routly, pers. comm.). As market pressures increase for local development in Cambridge and development in Hamilton and Toronto, the aggregates from these deposits will be accessed. Due to the heavy demand that is being placed on these deposits because of their strategic location the #1 and #2 ranked primary deposits within this node should be considered as significant resources.

Dunnville

The outlined bedrock resources are a significant source for aggregate production. The #1 ranked areas are especially important sections of the deposit for future quarry development because of the stone quality and relative ease of access to the bedrock.

CONSTRAINTS

Within the selected nodes, numerous constraints have been identified with regard to the development of aggregate sources. Current licensed aggregate properties, unlicensed sources, and reserves of primary significance with a high ranking are used as possible constraints to other land uses within the Grand River valley. The land uses are analysed at a scale of 1:50,000; thus conflicting uses can be recognized, but no detailed assessment can be specified for particular sites. The following analysis represents direct impacts of present or future aggregate mining on other specified land uses.

Luther Marsh

1. A designated ANSI (Area of National and Scientific Interest) south of Grand Valley, across the Grand River, conflicts with a #1 ranked primary deposit and a licensed property.
2. North of Grand Valley at Tarbert, a #2 ranked primary deposit and two unlicensed pits fall within an ANSI.
3. A large esker complex is located at Mount View and continues in a westerly direction for approximately 4 kilometres; it is designated as a primary source and ranked as #1 for West

Luther Township. An ANSI outlines the general formation of the esker, and GRCA property overlaps 2 unlicensed sources on the esker.

4. Two primary aggregate sources, ranked as #2, east of Monck and just north of Luther Marsh are conflicting with a variety of land uses. They fall within Agreement Forest land, GRCA property, ESAs, and wetlands. A hiking trail crosses the southern half of the deposit. Presently there are 2 unlicensed pits located northeast of Monck.

Cambridge-Paris

1. South of Preston, in the vicinity of Orr's and Barrie's Lakes and as far south as the Gilhom Marsh complex, a series of licensed aggregate properties and the #1 ranked primary deposit for North Dumfries are located adjacent to or overlap wetlands and ESAs.
2. Primary aggregate deposits underlie ANSI and wetlands north of Dean's Lake and west of Shep's Subdivision.
3. In the area between Wrigley Corners and Glen Morris, both licensed properties and sources of primary significance conflict with designated wetlands and ESAs. The Pinehurst Lake Conservation Area is located adjacent to this deposit.
4. In the Spottiswood Lakes area a #1 ranked primary aggregate source is located under both GRCA property and an ESA.
5. South of Glen Morris, on the east side of the Grand River a "long strip" of primary aggregate material (ranked #3) that follows along the river as far south as Paris underlies both GRCA property and ANSI land.
6. An ESA in the Blue Lake area is underlain by a #2 ranked primary deposit, and several unlicensed pits are located in the near vicinity.
7. A major portion of the Grand River Forest west of the Grand River, that extends from Shep's Subdivision in the north to the Spottiswood Lakes in the south, is underlain by aggregate resources designated as of primary significance. Future development of this area for mining poses a direct threat to the stands of Carolinian forest west of the river.
8. The extensive development of aggregate sites around the town of Paris may pose potential conflicts with heritage resources in and around the town as a result of externalities such as truck traffic or dust.

Dunnville

1. The primary concern for land use conflict in the Dunnville area lies in the vicinity of the large quarry reserves south of Dunnville. South of the Grand River there are 2 unlicensed quarries and licensed property that lie adjacent to wetlands, ESAs, and GRCA property.

PLANNING

The numerous constraints that have been identified indicate a need for a comprehensive understanding of the different resource bases within the Grand River valley. The development of aggregate resources has traditionally generated a considerable amount of land use conflict in southern Ontario. The mining of sand, gravel, and bedrock within the Grand River valley will continue to provoke land use conflicts, especially where local residents are affected. The large number of aggregate sources that lie within or adjacent to environmentally sensitive areas, especially between Cambridge and Paris, will also pose potential resource conflicts as sources are developed. This study has identified general constraints for the mining of aggregate resources. It provides an overview to understand the spatial relationship of aggregate mining to environmentally sensitive land uses. However, it is not enough that the spatial relationships be recognized; rather, this is the first step to a series of ongoing resource assessments. The

following recommendations are made to incorporate the management of aggregate resources as part of the planning for heritage resources in the Grand River valley.

1. ANSI, ESA, or wetland areas that are located on or adjacent to aggregate deposits should be identified throughout the Grand River basin. The correlation of primary deposits and licensed sources can presently provide adequate information to identify areas of potential land use conflict. Applications for aggregate licenses that fall within these environmentally sensitive areas should be required to have an environmental impact assessment. The present pit and quarry licensing procedure by the Ontario Ministry of Natural Resources provides the opportunity to review all applications in relation to environmentally sensitive areas.
2. The reclamation of depleted and abandoned aggregate sources should be actively pursued within the basin. With the proclamation of the new *Aggregate Resources Act*, the production fees levied on the operator provide for 1/2 cent per tonne to go to the Abandoned Pit and Quarry Rehabilitation Fund. This may provide a potential funding source if viewed in relation to the aggregate production figures within the basin. For example, in North Dumfries Township, 2,660,600 tonnes were produced from licensed sources in 1988 (Routly, pers. comm.). This would provide the Township with approximately \$13,000 for an abandoned pit reclamation fund for that year. The total levy fees available for the entire Grand River basin per year could provide a source of funding for identified reclamation projects within the watershed. In addition to the Abandoned Pit and Quarry Rehabilitation Fund is the 4 cent per tonne levy allotted to municipalities. This funding is designated to individual municipalities that bear the burden of aggregate extraction. For municipalities within the Grand River valley, reclamation and enhancement projects should be identified to help municipalities target the use of the additional levy funds for rehabilitation purposes.

An organized and managed approach within the Grand River basin is required to co-ordinate the funds from aggregate extraction that will be provided in the new *Aggregate Resources Act*. Municipalities, regions, and concerned agencies within the basin need to be co-ordinated in an attempt to mitigate present aggregate extraction and rehabilitate abandoned sources. A single, co-ordinated lobby for the basin could provide a stronger voice in directing funding and environmental concerns.

3. Pursue a development strategy for aggregate resources that are located on GRCA lands that do not affect environmentally sensitive areas. Sand, gravel, and bedrock are part of the heritage resources within the Grand River basin. These resources have the potential to provide a large revenue source that can be utilized to protect those areas that require funding for enhanced management. Excavation of deposits in designated GRCA lands provides an opportunity to benefit from the aggregate revenue and possibly enhance the modified landscape to better suit habitat or recreation needs.

The designation of the Grand as a Canadian Heritage River provides an opportunity for the Grand River Conservation Authority to co-ordinate the variety of planning agencies that have jurisdiction within the river basin. A lead agency is required to facilitate the development of aggregate sources with other resources of natural and cultural significance. Within this context, the GRCA can play the following roles:

- A central land use agency that maintains a perception of the Grand River basin as a "whole" land unit, not one that is subdivided by jurisdictional boundaries. The GRCA can function to create a revised management focus within the Heritage River mandate to co-ordinate agency involvement within the basin. This attitude to the management of the

basin provides an essential overview of the cumulative effects of development or other environmental and cultural problems.

- A nonthreatening forum to identify future land use conflicts and bring together lead agencies, such as the Ontario Ministry of Natural Resources and municipalities, the public, and concerned lobby groups to help resolve potential land use conflicts.
- A centralized data source for the resources within the Grand River valley. The multitude of agency involvement has fragmented the historical, cultural, and natural information that is essential for informed decision-making and planning.

Note:

A reviewer has noted the following additional needs which he saw as arising from this study:

- 1) The benefit to the communities should be compared with the cost to the community and the heritage landscape. What would happen to the scenic roads and natural landscape features in the vicinity of the aggregate resource areas? The roads are usually widened and straightened.
- 2) Landscape rehabilitation in the areas of concern will be much more costly than the production fees will afford. Some case studies could be done in this respect.

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PERSONAL COMMUNICATIONS

- Routly, D. Lands/Aggregate Supervisor, Cambridge District, Ontario Ministry of Natural Resources, Cambridge.

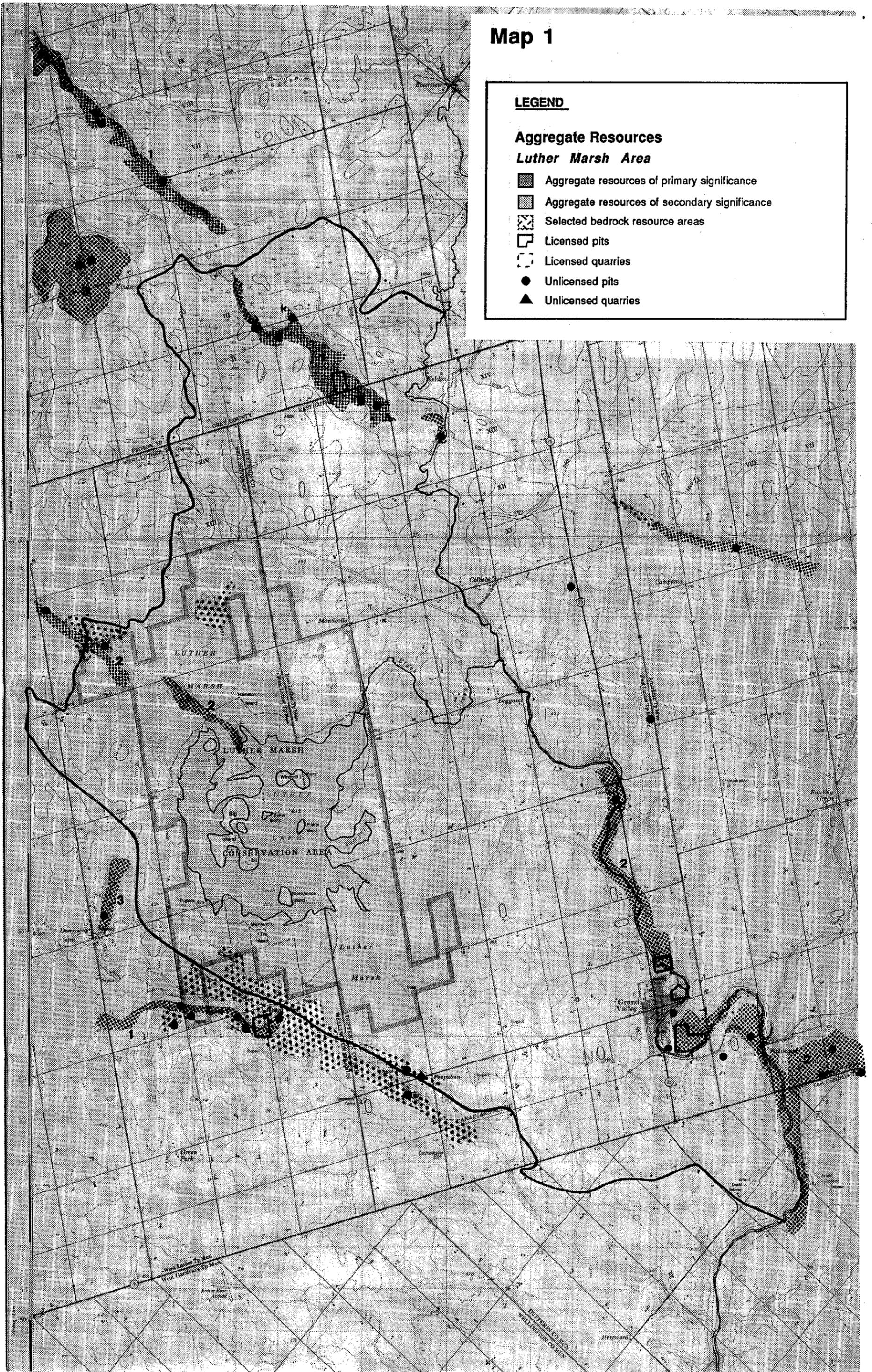
Map 1

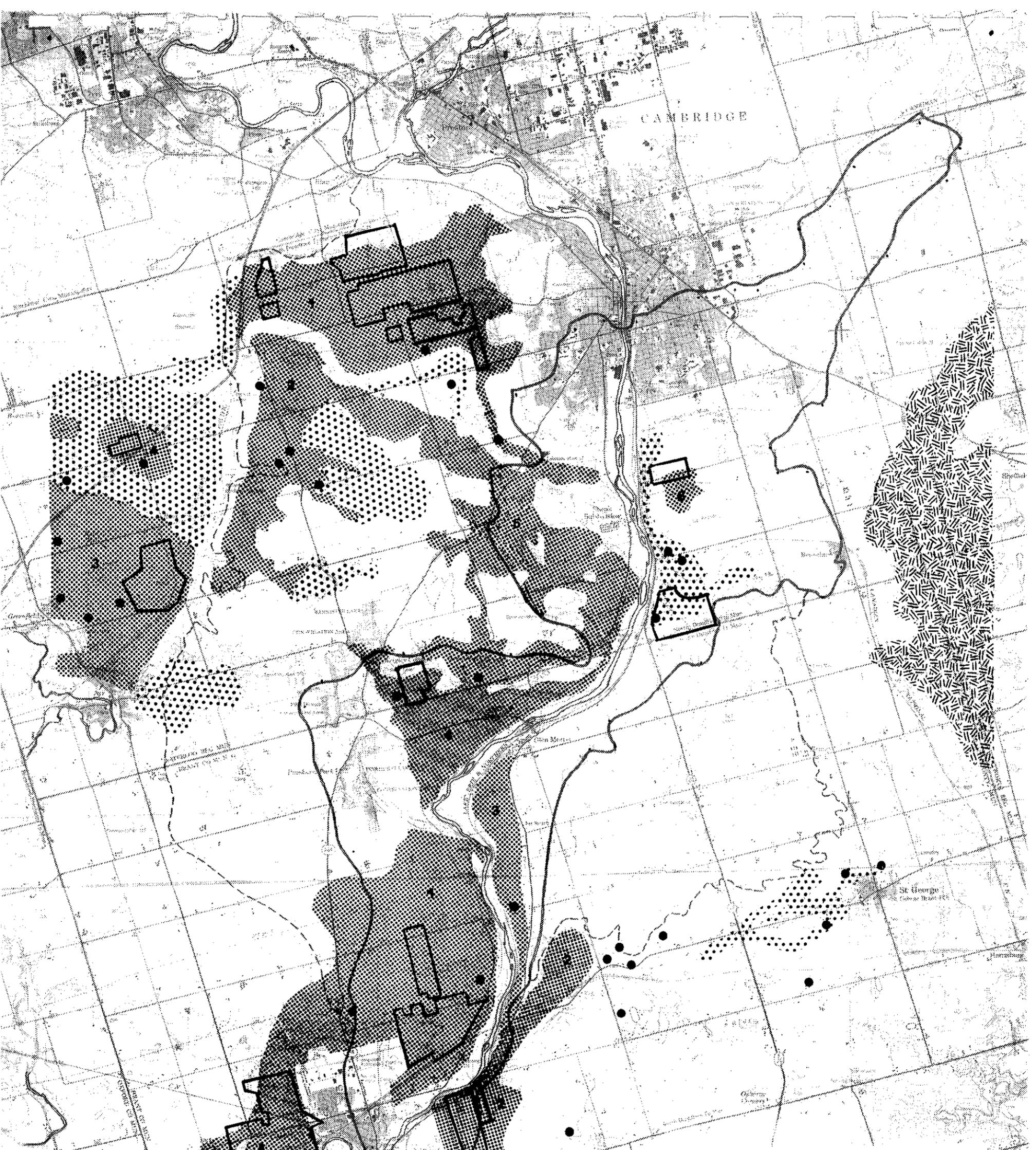
LEGEND

Aggregate Resources

Luther Marsh Area

-  Aggregate resources of primary significance
-  Aggregate resources of secondary significance
-  Selected bedrock resource areas
-  Licensed pits
-  Licensed quarries
-  Unlicensed pits
-  Unlicensed quarries





Map 2

LEGEND

**Aggregate Resources
Cambridge to Paris**

-  Aggregate resources of primary significance
-  Aggregate resources of secondary significance
-  Selected bedrock resource areas
-  Licensed pits
-  Licensed quarries
-  Unlicensed pits
-  Unlicensed quarries

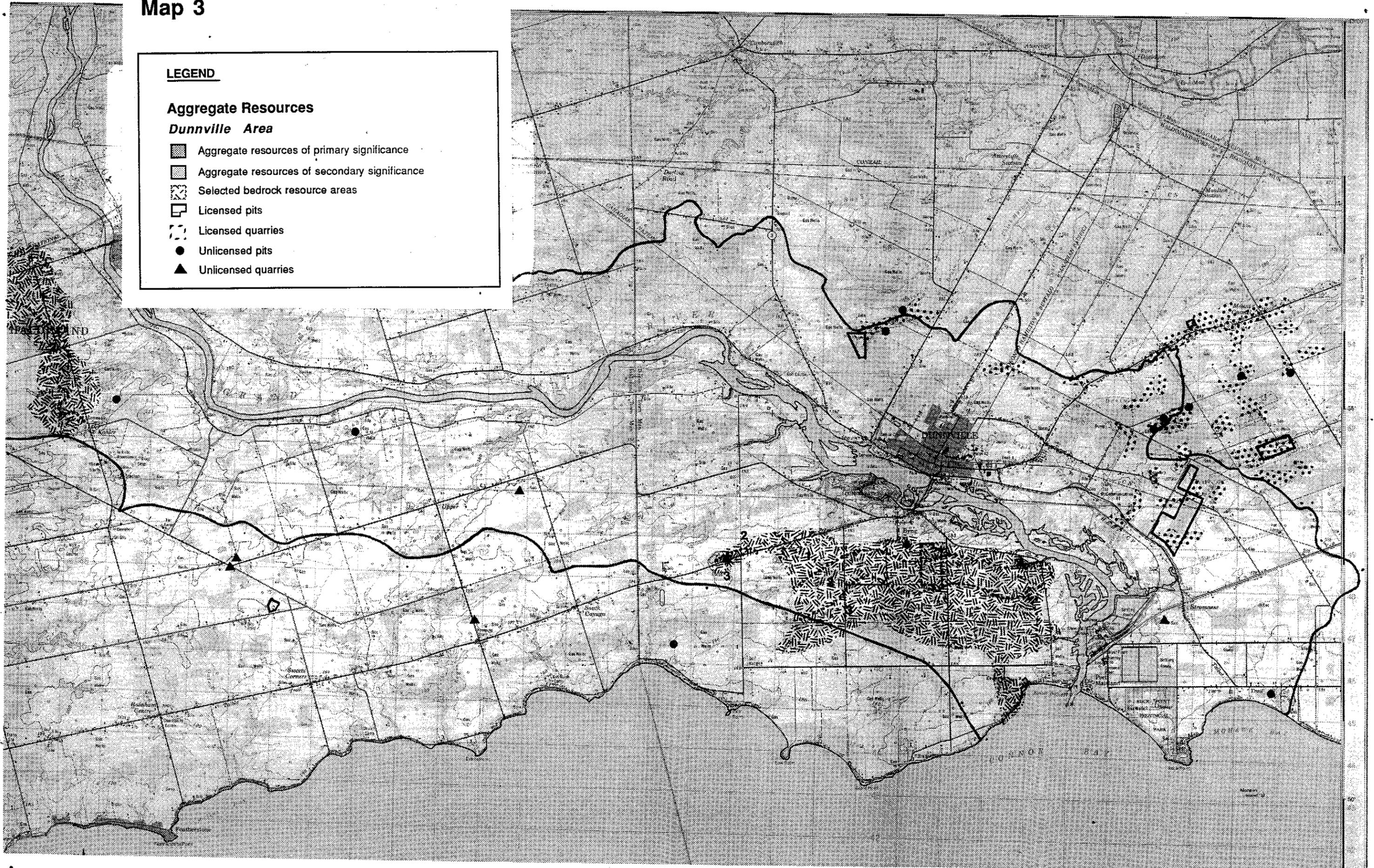
Map 3

LEGEND

Aggregate Resources

Dunnville Area

-  Aggregate resources of primary significance
-  Aggregate resources of secondary significance
-  Selected bedrock resource areas
-  Licensed pits
-  Licensed quarries
-  Unlicensed pits
-  Unlicensed quarries



Education and Grand River Heritage

Peter G. Genzinger

CONTEXT

A complex situation exists in the Grand River basin. Urbanization, industrial development, and agriculture all exert stresses of one type or another on the river environment. Recreation and tourism opportunities seem to be on the increase. At the same time, decisions need to be made about protecting the river's valuable human and natural heritage.

In light of this complex situation, heritage education can serve many purposes. First, it can educate us about where we have come from. Our historic heritage is important in that by examining it, we can see important patterns and processes that have shaped the basin. We may also see how various decisions on our part have affected our heritage. Secondly, heritage education can help us to understand more clearly our present condition. Thirdly, heritage education can help us to see the direction we are heading for in the future and, if necessary, help us to make decisions about desirable directions and how we might follow them. In this way, we are not only encouraged to think about the river and its surrounding environment, but also to act upon the knowledge we have received in a fashion that hopefully is useful for the future. Also important is the fact that many aspects of our river heritage such as flood control, urbanization, and recreation are similar to those found in other countries. Thus, people can be educated to concepts and concerns that apply to both the Grand River and other river systems as well. In this way people can be encouraged to "think globally" and "act locally" in regard to river systems. Many principles and purposes of environmental education have been proposed in the past. Those interested in these concepts may find texts by Parker and Meldrum (1973), Sharpe (1976), Swan and Stapp (1974), and Stapp (1965) particularly useful as reference material. What remains now is to put these concepts into practice in terms of Grand River heritage education.

The purpose of this report is to identify some important human and natural heritage resources that are of present and potential educational use. The scope is limited due to limitations on time and data collection. Thus, the report is not an exhaustive review of all information and research pertaining to educational opportunities existing within the basin. The term "education" in this context refers to formal types of learning such as high school and university courses, as well as informal types such as public nature centres or interpretive hiking trails. The main opportunities examined are found in several significant places or nodes along the Grand. Due to time constraints, the focus here is on one important node, the Cambridge-Paris area. Other significant areas and opportunities exist but have not been as fully researched.

PATTERNS

A number of heritage themes that are present in the watershed can be identified in terms of their educational aspects or usefulness. Since these themes have been described in detail

elsewhere in this study, the purpose of this section is to describe in general the themes that are important for educational purposes. Each of the major significant areas is listed and discussed in terms of the important themes found in the area. The general data on patterns is taken from the 1988 inventory of the river (Nelson and O'Neill, eds., 1989).

Luther Marsh

The most predominant themes found in this area are related to biology. Wildlife is a major theme, as the marsh provides habitat for some 134 species of breeding birds (Balser, 1989), as well as various types of mammals, amphibians, reptiles, and fish. Vegetative communities and plant species are also important themes in this area, as many sensitive plants are found here, and the vegetation creates habitat conditions conducive to a rich diversity of flora and fauna. These natural themes are also important in terms of nature and scenic appreciation. Human adaptation to the river regime is also an important theme as the Luther reservoir created here by the Grand River Conservation Authority (GRCA) serves to augment low water flows in the Grand River in the summer months, as well as helping to control downstream flooding. Earlier Irish settlements in the area contribute to the cultural mosaic of the Grand River basin (Epp, 1989).

Elora

This area contains a mix of human and natural heritage patterns. The predominant human themes include architecture, industrial heritage, native people, settlement patterns, and the cultural mosaic. Some predominant historic architecture includes the waterpowered grist mill as well as the old limestone buildings. Significant natural themes include the geology and geomorphology of the area as seen in the "Tooth of Time" and in the Elora Gorge itself, as well as representative and unique plant species found here.

Rockwood

Several themes can be found in this area. The unique geology of the site (potholes, cliffs and gorges) and the subsequent nature and scenic appreciation are two important natural themes that exist here. Mill ruins illustrate the themes of industrial development and human heritage appreciation.

St. Jacobs

The main themes for this area are industrial heritage and the cultural mosaic, due to the old mills, industry, and the important Mennonite history of the area.

Cambridge-Paris

This area contains the greatest concentration of significant themes. Human heritage themes include architecture, urban settlement patterns, industrial development, flood adaptation, and human heritage appreciation. Significant types of architecture (e.g. cobblestone buildings) can be found, notably in Paris. In Cambridge, the architecture of the old city of Galt reflects its Scottish heritage and settlement patterns. Examples of old mills found in the area are significant to the industrial theme. Levees and other flood adaptation measures can be found in both Cambridge and Paris. In terms of natural themes, significant geology and geomorphology,

significant plant species, vegetative communities, wildlife, and nature/scenic appreciation opportunities can be found in this area. The relatively undisturbed Grand River Forest, with its Carolinian species, provides outstanding opportunities in places for nature and scenic appreciation, while trails provide important access points and opportunities for observation.

Dunnville and the Lower River

Important human heritage themes in this area include archaeology, transportation and communication, native people, and human heritage appreciation. An important focus is the 19th century canal system which made river navigation possible and are linked to the industrial heritage. The native heritage is important in this general area as well. Important natural themes found in the area include plant species, vegetative communities, wildlife, and nature and scenic appreciation.

SIGNIFICANCE

As early as 1954, the Grand River valley was recognized as being significant in terms of outdoor educational instruction. The *Grand Valley Conservation Report* (Ontario Department of Planning and Development, 1954) expressed the opinion that publicly owned nature reserves should be established for the preservation of the significant natural features of the watershed. Such reserves were to serve as laboratories for outdoor educational instruction in various disciplines at the university, secondary, and primary school level, while satisfying recreational demands at the same time. In this context, it was stated that "the success of this program of outdoor instruction depends on the preservation and satisfactory management of conveniently located study areas..." (p.122).

Since that report was written, outdoor environmental education has achieved a much higher priority in schools due to increasing concern about human impacts on the environment. For example, in 1971 an Outdoor Education Department was created by the Waterloo County Board of Education to assist teachers from Kindergarten to Grade 13 in planning and conducting outdoor education programs. This was followed by the publication of a teacher's guide identifying some outdoor education facilities within Waterloo County (Christie, 1972). The booklet dealt with the history, geography and agricultural development of Waterloo County and included historical and geographical field trips. More importantly, many significant areas of natural and human heritage were identified as educational opportunities, although not specifically labelled as "heritage" features in the report.

The Grand River Conservation Authority (GRCA) has also established major outdoor education programs. The Authority assists with the outdoor education programs of 5 Boards of Education in the watershed (Wellington County Separate, Brant County Public and Separate, Haldimand-Norfolk Public and Separate) and acts as a consultant for 2 others (Waterloo County Public and Separate). This amounts to the GRCA handling over 750 classes per year. These outdoor education classes cover not only traditional subjects such as ecology, geology, and natural history, but also subjects such as art, English, and math (Dowson, pers. comm.). Many classes have to be turned away because of lack of staff or sites to cope with the demand. The Grand River basin and its associated features and processes play an integral part in the overall scheme of outdoor education.

In determining the significance of natural areas, some evaluation systems include educational use or potential in their list of evaluative criteria (Smith and Theberge, 1986). Scientific use or potential may also be considered, as research is a part of the educational process. Recreational activities also can provide simultaneous opportunities for learning.

This evaluation will consider the past and present educational uses of the major significant nodes in the watershed, including potential uses of these areas. Educational uses include formal learning (e.g. elementary, secondary, and post-secondary schools) and informal or recreational learning (e.g. conservation area programs, naturalist club programs, etc.). In order to avoid problems associated with a subjective ranking system the uses will be listed without assigning a ranking to them.

In addition, a map has been prepared showing some opportunities for the Cambridge-Paris node (Map 1). It is designed to give a general idea of where opportunities are located within the main area. The map illustrates the sites that are presently used and also some having potential for use. This includes human heritage sites, natural heritage sites that are not specially designated, Conservation Areas, some Environmentally Sensitive Areas (ESAs), libraries, and museums. Also included on the map are the Grand Valley Trail, and a potential educational driving tour (Genzinger, 1989) that includes both human and natural heritage sites. The driving tour starts at the Wrigley Corners Outdoor Education Centre and finishes in Cambridge at the Mill Race Park. A more detailed map of ESAs and Areas of Natural and Scientific Interest (ANSIs) is included in the reports on natural heritage by Balsler and Steinacker. Other resources are probably available but have not been mapped as yet. This type of mapping could also be done for the other significant areas but has not been included in this report due to insufficient data and time constraints.

Luther Marsh

This area was identified in the 1950's as being worthy of preservation as a botanical reserve and valuable for educational and research purposes. The area was noted as being accessible to high schools at the northern end of the watershed and to the universities of the region. It was observed that "its educational value could be enhanced if properly publicized and adequately protected" (Ontario Department of Planning and Development, 1954: 124).

Since the 1954 report, the area has been purchased by the GRCA, and is now classified as an ANSI by the Ontario Ministry of Natural Resources and is also a Wildlife Management Area. Presently, the area is the subject of many special events and school tours run in cooperation with the GRCA, which owns and operates the Luther Marsh Wildlife Management Area. An example of this type of formal education is field trips to the area by classes from the Waterloo County Board of Education (Glew, pers. comm.). The GRCA also has its own set of interpretive displays, nature trails, and observation sites set up here that are open to the public for both formal and informal learning. Ducks Unlimited, a private conservation group, runs the Green Wing program at this site. This education program is offered to school classes or outside organizations such as the Boy Scouts and deals with wetlands management for duck habitat. The Federation of Ontario Naturalists (FON) also runs tours in the marsh. As well as educational programs, regular research studies are hosted at the marsh by public educational institutions and private organizations such as the Ruffed Grouse Society.

There is good potential for future educational programs at this site. Perhaps the best way to increase educational opportunities here would be through the construction of an interpretive centre, possibly by the GRCA and/or other organizations, which would handle formal educational programs for schools and informal programs for the general public. Currently, officials in the Waterloo County Board of Education are considering building an interpretive centre here which would enhance the Board's own outdoor education program (Glew, pers. comm.). Another potential for education is through a driving tour. The *Grand Valley Conservation Report* (1954) developed a scenic driving tour which included Luther Marsh on its route. Such a scenic tour could incorporate educational elements through the use of

roadside displays or tour pamphlets which would interpret different sites and could be handed out through the GRCA, local visitor centres, etc.

Elora

Few educational programs are currently being run in the area. However, the GRCA does offer some outdoor education at the Elora Gorge Conservation Area as well as publishing an information pamphlet (Deacon, pers. comm.). There is also some potential for future programs. The network of trails around the gorge and the Grand Valley Trail itself offer good vantage points from which to examine the unique geology of the area. This also includes the possibility of some sort of self-guided walking tour using interpretive stations or a tour book, or a tour led by a naturalist/guide. A small interpretive centre could be built near the site as well. In the town of Elora, a walking tour has been developed around the town's historical structures such as the old grist mill and limestone buildings. The tour could be used for both formal and informal educational purposes. The Wellington County Museum and the Elora Public Library offer historic education and research opportunities. This site could also be included in a scenic/interpretive driving tour.

Rockwood

This site has no specific facilities for educational purposes and no major programs. The GRCA does, however, publish a pamphlet with information on the Rockwood Conservation Area which is available free of charge to hikers and other interested parties. There is some potential for future educational use here, such as a small interpretive facility to educate the public about the area's unique geology, history, etc. Rockwood was also part of a scenic driving tour developed previously along a tributary stream of the Grand (Ontario Department of Planning and Development, 1954). This scenic tour has possibilities as a self-guided interpretive driving tour.

St. Jacobs

Currently the main educational opportunities in this town are the Meetingplace, an interpretation centre open to the public which presents an account of Mennonite history and lifestyle; and the Maple Syrup Museum, an exhibit on the importance of maple syrup production to the area. There is also a public library that could provide some research opportunities. In a larger context, the town and the surrounding area can be taken as an example of a small community which has survived for many generations with little change. As Virgil Martin points out, the town is interesting historically and culturally as an example of a distinct traditional community. He also suggests that it can "...make a great contribution in providing a standard for evaluating the personal and social costs of twentieth century 'progress'." (Martin, 1979:93). Thus, the area provides a good opportunity for human heritage education.

Cambridge-Paris

This node is one of the most significant in terms of both present educational programs and future potential. A previous report has identified many opportunities for education with respect to both human and natural heritage themes (Cenzinger, 1989).

Considerable educational use is made of this area already. One of the biggest advantages it offers is its proximity to the cities of Kitchener, Waterloo, and Cambridge. In

terms of formal education, one of the largest users of the area is the Waterloo County Board of Education. Its outdoor education centre at Wrigley Corners is located within several kilometres of the river. This facility handles over 20% of the Waterloo County Board of Education's school population (Glew, pers. comm.). Over 50% of the school population is turned down because of lack of teachers and space. From this centre, field trips are regularly taken to nearby Environmentally Sensitive Areas (ESAs) such as Bannister Lake and F.W.R. Dickson Wilderness Area, as well as directly down to the river at access points such as the Spottiswoods lookout, near Spottiswoods Lake. In this setting, students learn about the ecology of the area (such as the important sections of Carolinian forest), natural history, native history, fresh water ecology, forest management, and wildlife. Fresh water studies are done at nearby Pinehurst Conservation Area, while bird counts and banding are done near the Wrigley Corners Centre. The numerous ESAs and ANSIs located in the area provide excellent opportunities for natural heritage education and research.

The GRCA also runs its own programs in this area, with some being offered in co-operation with the area school boards or private groups such as the Kitchener-Waterloo Field Naturalists. Most of the programs are run from the wilderness areas in the immediate vicinity (F.W.R. Dickson, Bannister Lake) or Conservation Areas (Pinehurst Lake), and focus on the subjects of local ecology and natural history. These areas also contain nature trails for public use. The F.W.R. Dickson area has a small interpretive shelter for visitors. In addition to the services offered at the sites, the GRCA has various mobile programs, such as the Grand Van, which is sent to various spots throughout the watershed to educate students and the public about aspects of the watershed and its management through exhibits, lectures, field studies, or tours. Included in this program is a section on the significant aspects of the Carolinian forests (Deacon, pers. comm.).

In addition to these two main actors, several smaller public and private organizations offer educational programs in this area. The K-W Field Naturalists organize hiking tours and bird counts at sites such as the Branchton Rail Line, the Sudden Tract, and in various places along the Grand Valley Trail (Lamb, pers. comm.). The University of Waterloo Heritage Resources Centre (HRC) also runs a summer outdoor experience program which educates participants about some of the significant heritage resources within the watershed through visits to several sites in the area, including some ESAs.

Several informal programs exist for human heritage features. Cambridge has several self-guided walking tours for the public, one which takes visitors past some of the historic structures of Preston and another which is a tour of the historic buildings of old Galt near the river. Part of the Galt tour includes the Living Levee, a river site containing historic buildings and ruins which has been preserved at Mill Race Park for interpretation purposes (Cambridge Community Services Dept., n.d.). The Paris Local Architectural Conservation Advisory Committee (LACAC) has also developed a walking tour for the public of significant historical sites in the town of Paris (Paris Local Architectural Conservation Advisory Committee, n.d.). Other opportunities for education and research include the Cambridge archives, Paris Public Library, and the Paris Museum and Historical Society.

Much potential exists in the Cambridge-Paris area for future educational activities. The GRCA owns several parcels of land located near the town of Glen Morris and situated close to the river. This land may be opened up in the future for educational purposes and also to give much needed access to the river in this area (Dowson, pers. comm.). An interpretive centre dealing with the natural and human heritage features of the area could be built on one of the sites. There is also the possibility of expansion at the Wrigley Corners Education Centre site or construction of a new facility by the School Board somewhere in the vicinity due to the increasing demand for outdoor educational facilities and programs (Glew, pers. comm.). The

demand for both formal and informal types of educational programs means that existing Conservation Areas such as Pinehurst could step up their own interpretive programs.

There is also the potential to combine the significant human heritage themes with the significant natural themes in driving tours and walking tours. A previous report has outlined a driving tour which starts at Wrigley Corners and visits both significant natural heritage areas and human heritage areas, including sites in Paris and Cambridge (Genzinger, 1989). Such tours could be used for both formal and informal educational purposes. The report also concludes that there are opportunities to use sections of the Grand Valley Trail for interpretive purposes. For example, a section of the trail that runs through Paris and passes by some significant architectural sites could be used for interpretive tours (this is part of the current Paris LACAC tour). Many sites along the trail are good for interpretive education, such as a section from Spottiswoods Lookout to Glen Morris which has already been used by the Wrigley Corners Centre. The entire section of the trail from Paris to Glen Morris is an excellent opportunity for education in that it passes by old railway features, Carolinian species and other human and natural heritage resources. In this same context, the Grand Valley Trails Association is presently investigating the possibility of selecting several areas along the trail, erecting interpretive signs in selected sites, and publishing an interpretive package for use by both school groups and the general public (Howlett, pers. comm.).

Dunnville and the Lower River

Presently, some opportunities exist in terms of education and interpretation. The Byng Island Conservation Area is the most immediate opportunity for education within this area. Other conservation areas nearby include Lafortune Conservation Area near Caledonia, and Brant Conservation Area outside Brantford. The nearest educational site is the Taquanyah Nature Centre, which offers programs for schools in the region and the general public. App's Mill Nature Centre is located in a conservation area on Whiteman Creek between Brantford and Paris, and also offers outdoor education programs for schools and the public.

The lower Grand is very important in terms of human heritage opportunities. A concentration of archeological sites can be found within this area, with representations from the Paleoindian (ca. 9000 B.C. to ca. 5000 B.C.), Archaic (ca. 5000 B.C. to ca. 1000 B.C.) and Woodland (ca. 1000 B.C. to ca. 1650 A.D.) cultural periods (Epp, 1989). Important native heritage features and exhibits can be found around Brantford, and include the Mohawk Chapel, the Mohawk Institute, the Woodland Cultural Centre, the site of the Mohawk village, the site of Brant's Ford, Chiefswood, and the Salt Springs Church.

Another important human heritage feature is the 19th century canal system which allowed the lower river to be opened up for navigation and shipping. Remains of the canals, locks, mills, and ghost towns associated with the canals can still be found today. Some interpretive exhibits have been set up in the lower river area explaining the history of the canals and providing a map of the canal layout.

The city of Brantford and its vicinity have some important educational opportunities as well. In addition to the important native sites, historic sites such as the Bell Homestead, the Watt's powerhouse, the Massey foundry and the remains of the canal and lock sites can be found here. In terms of natural heritage, the "Dyklands" area of the town is used by the GRCA for educational programs dealing with dykes and flood control, plant succession, and water quality analysis (Dowson, pers. comm.).

There is good potential for interpretation of the human heritage of the area. Although some small-scale interpretation exists, there might be opportunities for constructing an

interpretive centre or museum detailing the entire history of the canals and the associated industrial and economic developments. Many of the historic features in the area are recognized as being significant either nationally, provincially or locally, and have some form of interpretation such as a plaque or interpretive guide at the site (Epp, 1989). However, many of these sites also exist as separate entities and are not linked to each other in any way. This problem might be overcome through the development of a driving tour which would visit many of the significant heritage sites in the lower region of the river, linking the native, cultural, economic, and industrial history of the area. In terms of natural heritage features, the Dunnville marshes and Byng Island have potential for future interpretive programs in formal and informal education, particularly Byng Island, which has some established nature trails at present.

CONSTRAINTS

In the context of educational opportunities, the type of constraints to be discussed are those which interfere with present or potential opportunities in the basin.

One of the biggest constraints on any type of education is inadequate funding for various projects, and this holds true for environmental education as well. One of the most pressing needs for both the GRCA and the various school boards is funding to build and maintain adequate interpretive centres and facilities to meet the growing demand for outdoor education. In the same vein, there is also the need for properly trained staff to handle the teaching load. Also needed are funds to purchase or lease parcels of land on which to build interpretive centres, as well as land which will provide adequate public access to the river and possibly land for future educational needs.

Another constraint on education is urban and rural development. Industrial and residential development in urban areas can threaten historic structures that have good educational potential. Development processes in the urban environment can adversely affect various aspects of the river environment studied in schools, such as water quality. However, such stresses can be used to illustrate the impact of human development on the environment. In some cases urban development can have positive effects in the educational sense, such as the development of the Living Levee in Cambridge.

Development in rural areas threatens to remove valuable sections of land from the river environment. In many cases, it is the relatively undeveloped nature of the land which makes it valuable for educational purposes as being representative of the landscape that once existed in this area. The Grand River Forest between Cambridge and Paris is a prime example of this type of conflict with development. If this forest is removed, a valuable educational resource will be lost, with very little of this type of forest left in the basin. Development can also affect the quality of the river environment through water pollution, sedimentation, increased erosion, and other changes. Many of these development stresses are of even greater concern on smaller tributaries of the Grand.

Of growing concern is the objection of private landowners to increasing use of natural areas by the general public. This constraint is becoming particularly noticeable in the case of landowners versus public trail users. Much of the land that trails pass through is privately owned land and used with the permission of the landowners. Landowners might object to increasing use of trails by school groups and others because of fears of disturbance or deterioration of their lands. This situation could also lead to some lands being taken out of the public domain. This was the case with the Branchton rail line, where the local landowners fought to keep an abandoned railway line that was to be made into a hiking trail out of public

hands by trying to purchase the land themselves. A related issue is the question of who will be liable for accidents that take place on privately-owned lands.

Another type of constraint is that of conflict between education and other activities, such as recreation and hunting. Areas suitable for outdoor education in many cases are also good for recreational purposes. Recreational activities can lead to the degradation of natural areas if activities are not closely regulated. However, in many cases, recreation and educational activities can exist co-operatively, for example in conservation areas with zones designated for camping and nature trails. Hunting, however, is one activity that may not be compatible with other uses. This is evident in places such as Luther Marsh, where hunting is allowed in the fall and the winter, which may conflict with education, recreation, and other uses of the area.

Educational activities themselves can create problems if not properly managed. Like recreational activities, educational trips and outings can cause degradation of natural areas if the use of a particular area is too great. Similarly, although little is known about the effects of auto tours, there is the possibility that increasing popularity of such excursions could lead to impacts such as higher volumes of traffic on roads and increasing production of harmful auto emissions.

PLANNING

Based on the previous findings within the context of education, several issues and proposals can be identified for planning purposes. One of the most significant in terms of education is how to manage development stresses in the significant nodes so that education programs will not be deprived of potential and existing sites to visit. A partial solution to this issue would be the acquisition of some of these areas by the GRCA, the various Boards of Education, or perhaps by a merger of these groups with other interested parties such as the local universities (Waterloo, Wilfrid Laurier, and Guelph). Possibly such a group could be set up to help manage the areas as well. Funding for such a venture will likely be a problem, but perhaps designation of the Grand as a Canadian Heritage River will indirectly help agencies to procure funds from the provincial or federal government to aid in protection of the valuable river heritage.

Another issue in terms of education is how to communicate the concepts and information put forth in the Grand River Heritage Study not only to teachers at all educational levels, but also to members of the general public. The GRCA has already initiated such a process through discussion of the Heritage River designation in its mobile display centre (the Grand Van) as well as displays in malls. However, at present there is no plan that would ensure that all the important themes are presented to the public. Future planning for education should develop an overall heritage education strategy.

Other options exist for heritage education. One idea that has been suggested is to build a group of museums or exhibits running the length of the river which would focus on the significant heritage themes. This could possibly be done through an agency such as the GRCA. Another possibility is to hold one or several conferences on the Grand River heritage for teachers from all disciplines, various environmental educators, and representatives from organizations such as the Grand Valley Trails Association and the various historical societies in the basin. This conference could help to raise awareness of the educational potential of the basin and possibly develop methods to present this information to both students and the general public. It could be sponsored through the Heritage Resources Centre at the University of Waterloo.

The recognition of the Grand River Forest as a biosphere reserve by the United Nations Educational, Scientific and Cultural Organization (UNESCO) would serve in emphasizing the

special status of the area and promote its educational potential. Along with this significant area, other areas in the basin should be linked together through educational programs to promote the appreciation of the river valley heritage overall.

With respect to the growing use of trails for educational purposes, contact will need to be made with private landowners to ensure that sections of trails which pass through their property will continue to be open for use. Anyone who takes outdoor education classes across privately owned land should contact the landowner first. Landowners should be made aware of the growing demand for outdoor education and that trails serve an important function in this respect. This might be done through the Grand Valley Trails Association, which has a landowner contact person. Presently, teachers from the Waterloo County Board of Education who use the Grand Valley Trail must make contact themselves with private landowners. Measures must also be developed to minimize the impact of educational and other uses on private and public land. Also, the question of accident liability on privately owned lands needs to be addressed in planning future educational programs.

Much information still needs to be gathered on opportunities for heritage education sites, programs, and management arrangements. Additional sites should be inventoried and recorded for future use. Interpretive guides or displays could be established at some sites. Landowners should be contacted and informed about the educational uses and potential of their properties. An interpretive guide which includes the significant aspects of Grand River heritage could be developed for the Grand Valley Trail. One way in which these tasks might be undertaken is through the Ontario Environmental Youth Corps. Students or others hired through this program could carry out these duties in co-operation with the University of Waterloo's Heritage Resources Centre, which would act in a supervisory role.

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PERSONAL COMMUNICATIONS

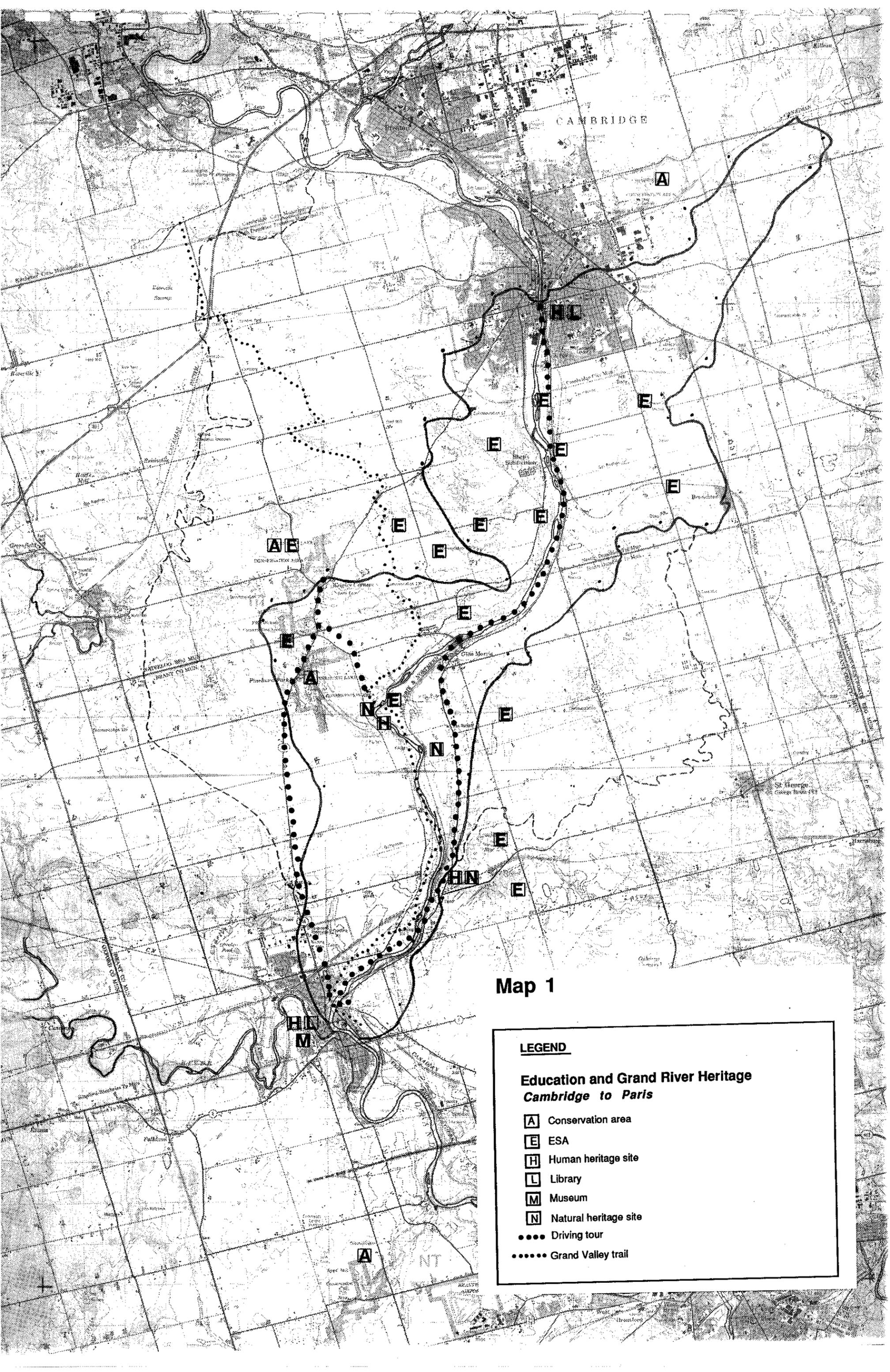
Deacon, R. Community Relations Officer, Grand River Conservation Authority, Cambridge.

Dowson, R. Manager of Marketing/Interpretive Services, Grand River Conservation Authority, Cambridge.

Glew, F. Outdoor Education Consultant, Waterloo County Board of Education, Kitchener.

Howlett, G. President of the Grand Valley Trails Association, Brantford.

Lamb, L. Ecology Lab, Technician, Faculty of Environmental Studies, University of Waterloo.



Map 1

LEGEND

**Education and Grand River Heritage
Cambridge to Paris**

- [A] Conservation area
- [E] ESA
- [H] Human heritage site
- [L] Library
- [M] Museum
- [N] Natural heritage site
- Driving tour
- Grand Valley trail

Communications and Information

Ayumi Bailly

CONTEXT

The Need for Study of Communications and Information

From a broad point of view, the roles and impacts of communications and information use have tremendously influenced the nature of today's society and its development through time (McLuhan, 1964). With increasingly large organizations and greater specialization, effective communications within and among groups are crucial in order to achieve goals (Haney, 1973: 518). Understanding the nuances of manipulating information and its influence on behaviour has significant potential for improving management operations in any field.

In light of this, it is surprising to find that little attention has been paid to developing an understanding of communications as a tool in environmental management and in heritage conservation. Usually researchers in these fields focus on the more concrete techniques of practice, such as legislation or programs, and overlook the implications of information strategies or of the interactions of individuals or organizations. There is some evidence of growing awareness in the environmental management literature of the importance of understanding the dynamics of communications and information; however, it is sparse and mainly presented within the last few years--a long time since Ingram's (1973) seminal discussion on the flow of information in environmental decision-making. The areas that show this awareness include public participation (e.g. Schoenmaker, 1986; Rollins and Dieter, 1985), forestry (McGee and Levy, 1988), parks and recreation (Richardson, 1987; Ward et. al., 1987; Miller and Mutter, 1985), arctic studies (Stenbaek, 1987), and coastal management (Needham, 1986). The aspects of communications examined by these researchers vary as much as the interests--from the formal processes of soliciting public input, to the interactions of key decision-makers, to evaluations of internal communications, to the role of the mass media, to the use of language in planning.

ABBREVIATIONS USED IN THIS REPORT

CPS	Canadian Parks Service
EEAC	Ecological and Environmental Advisory Committee
GRCA	Grand River Conservation Authority
K-W	Kitchener-Waterloo
LACAC	Local Architectural Conservation Advisory Committee
NHL	Natural Heritage League
NHSP	Natural Heritage Stewardship Program
OMAF	Ontario Ministry of Agriculture and Food
OMCC	Ontario Ministry of Culture and Communications
OMMA	Ontario Ministry of Municipal Affairs
OMNR	Ontario Ministry of Natural Resources
OMOE	Ontario Ministry of the Environment
RMW	Regional Municipality of Waterloo

This relative lack of attention to the role and implications of communications is surprising because the problems and concerns that face practitioners of heritage planning and conservation are similar to those of any other practitioner of planning and management. For instance, management issues already identified in the Grand River watershed include efficiency, effectiveness, accessibility, accountability, co-ordination, and public awareness (Nelson and O'Neill, 1989:230).

In beginning an attempt to describe and analyze the communication dynamics of both human and natural heritage conservation in any region, several groups of questions emerge that illustrate the complexities of inter-personal and inter-organizational linkages. According to Haney (1973), one must understand communications at the level of the individual in order to understand the organization; thus, one group of questions addresses this aspect--in what ways do the members of the organization interact? What is the nature of the organization's decision-making process? How is information disseminated through the organization?

Another group of questions addresses the communications among organizations. How do the various agencies interact? How frequently? In what form(s)? What is the distribution of influence?

A third possible group of questions addresses the history of development of the organizations. What past pattern(s) of organizational development influenced the current pattern of communications to be what it is?

For this study, the research focus is on determining the current general patterns of inter-agency communications in the Grand River basin. The limiting of the focus is a result of the need to study within a short period of time the management implications for the implementation of the Heritage River program.

Communications and Information Needs in the Grand River Basin

In the Grand River basin, communications and information needs are particularly significant for successful implementation of the Heritage River Program. The basin already has a well-developed, complex institutional framework within which the Heritage River program would have to function. Its success depends on the acceptance and co-operation of all relevant government agencies as well as the non-government groups. Recognizing this, it seems desirable to implement the program through the existing institutional arrangements as much as possible. In order to implement a program which will affect the whole river system, it is especially important to have an understanding of the current linkages among agencies having dealings in both human and natural heritage conservation. Such an understanding could lead to some prescriptions for effective implementation of a Heritage River program.

METHODOLOGY

In the light of the foregoing, as well as limited time and research resources, the most appropriate research method seemed to be focussed interviews. An interview guide (see Appendix A) was developed to elicit information on the patterns of current communications among the various Grand River agencies and groups involved in some aspect of heritage conservation. This guide was used as a preliminary inquiry with thirteen key actors in a sample region of the watershed--Kitchener-Waterloo to Brantford (see Table 1 for a list of interviews). The primary intent of the inquiry was to be descriptive rather than prescriptive. Since the sample was concentrated in the central section of the watershed, only one or two

generalizations have been made about activities in the northern and southern ends. The cross-section of thirteen agencies was selected to represent human and natural heritage agencies, as well as government and non-government agencies. Of these thirteen agencies, eleven were interviewed for natural heritage and six for human heritage; four of the agencies (the municipal planning departments) were interviewed for both natural and human heritage. The interviews were conducted in person with one knowledgeable person from each organization; two interviews were conducted over the phone due to time constraints. These people responded to the questions from their own experiences; therefore, the responses are not to be considered as the official response of the agency as a whole.

The interview guide was designed for the following purposes:

- 1) to identify the key organizations or actors (Question 1),
- 2) to estimate the extent of interaction among them (Questions 2 and 3),
- 3) to estimate the nature, extent, and formality of the information produced by each actor (Questions 4 to 11),
- 4) to estimate the current patterns of communications (Question 12), and
- 5) to identify areas for improvement and possible solutions (Question 12).

Table 2 contains a summary of the interview responses in a condensed chart form. Discussion of the responses follows.

PATTERNS: COMMUNICATIONS AMONG ACTORS IN THE GRAND RIVER BASIN

Key Organizations or Actors

Natural Heritage

For the protection of natural areas, the same key actors were identified by the eleven people interviewed for natural heritage. These organizations were: the Grand River Conservation Authority (GRCA) (cited by 91% of the respondents), the Ontario Ministry of Natural Resources (OMNR) (cited by 82%), and the Ontario Ministry of the Environment (OMOE) (cited by 64%). The GRCA was identified most frequently because of the scope of its geographical jurisdiction and its involvement with other organizations at the grassroots level (Carleton, 1989, pers. comm.; Roth, 1989, pers. comm.; Ambrose, 1989, pers. comm.). The OMNR and OMOE were identified for their powers to designate and protect special natural areas and for their authority as provincial government bodies (MacDonnell, 1989, pers. comm.; Beaumont, 1989, pers. comm.; Thorsen, 1989, pers. comm.). The Ontario Ministry of Agriculture and Food (OMAF) was cited by 45% of the interviewees as being an underestimated actor with considerable funding strength and powers over agricultural lands (Moull, 1989, pers. comm.; Carleton, 1989, pers. comm.). Municipalities were identified by 64% as having potential to protect natural areas which is currently unrealized because although they have the ability to identify special environmental areas, they do not have the financial or human resources to monitor and enforce on a regular basis every area within their boundaries. (Thorsen, 1989, pers. comm.; Roth, 1989, pers. comm.).

Human Heritage

For the protection of human heritage, some differences appeared between those organizations concerned with the protection of architectural features and those concerned with other forms of human heritage, i.e. museums and galleries. Among the organizations involved in protecting architectural features, the Ontario Ministry of Culture and Communications (OMCC) appears to play the key role of co-ordinator and information disseminator in the Waterloo area, since it

is the umbrella organization for LACACs and the Ontario Heritage Foundation (Sosnoski, 1989, pers. comm.). LACACs themselves were considered by all those interviewed to be significant in each area. Occasional area- or issue-specific groups emerge in reaction to perceived threats, but these remain somewhat on the fringe without becoming significant actors in the long term (Sosnoski, 1989, pers. comm.). Among the museums and galleries, there does not appear to be one single major actor; instead, a formal network is developing (see Appendix B for a list of the organizations involved) under the title "It's About Time" (McMillan, 1989, pers. comm.).

Extent of Interaction

Natural Heritage

The main mode of interaction reported by approximately 73% (8 out of 11) of the people involved in agencies which protect natural areas is the commenting process on municipal development proposals. Sixty-three percent of these people (5 out of the 8) have little contact with others apart from this process. This interaction occurs as often as there are proposals circulated and usually is limited to written responses to the content of the proposal; only occasionally is direct verbal contact made, either through phone calls or meetings.

With the exception of the GRCA, the Natural Heritage League (NHL), and planners in the Regional Municipality of Waterloo (RMW), all of the people interviewed reported that their agency received no unsolicited information in any other form from other agencies currently operating in the area. The GRCA has regular contact with numerous agencies throughout the basin and so keeps informed. The RMW co-ordinates regular meetings for the municipal planners within its boundaries. However, the information exchange is limited to the planners; they do not receive information from agencies outside of the planning network. As the umbrella organization created through the Ontario Heritage Foundation to implement the Natural Heritage Stewardship Program, the Natural Heritage League is an initiative to encourage co-operative projects for natural heritage protection with private landowners; as such, the NHL collects information on environmental protection from organizations, such as the OMNR, and conveys it to private landowners (Moull, 1989, pers. comm.). Two out of the 11 interviews (18%) actively seek out information from other agencies; 5 out of the 11 (45%) are sought out by others regularly as a source of information (see Table 2).

Beyond these exceptions, there is reportedly little other interaction among agencies. Approximately 40% (5 out of 11) of the representatives of agencies involved in natural heritage made comments to support this statement, to the effect that almost no information circulates, and that such information would be useful to everyone if awareness could be improved of the various agencies and the resources they offer (Carleton, 1989, pers. comm.; Roth, 1989, pers. comm.; Curtis, 1989, pers. comm.; Ambrose, 1989, pers. comm.; Moull, 1989, pers. comm.). In addition to the problem of inter-organization communication, there may also be a problem of intra-organization communication, i.e. information filtering through the larger organizations (Carleton, 1989, pers. comm.; Roth, 1989, pers. comm.).

Human Heritage

Unlike the agencies involved in natural heritage, the agencies involved in human heritage appear to utilize informal as well as formal means of communication among themselves. Within the network of agencies concerned with architectural features, informal communications reportedly occur through membership overlaps; thus the groups keep informed of others' activities (Sosnoski, 1989, pers. comm.). Formal communications among these groups are primarily guided by the OMCC, which plays a strong co-ordinating role by organizing professional workshops and lectures, circulating directories to all agencies, etc. The OMCC also

assimilates and makes available all published information produced by its member groups (Sosnoski, 1989, pers. comm.). These agencies also have regular, formal contact with their municipalities as advisory committees.

All of those interviewed for human heritage reported that their agencies interact through regular meetings. However, the agencies do not all meet together; rather, they meet as selective networks. The museums and galleries in the Waterloo area meet together, the LACACs meet through the OMCC, and the RMW planners interact through the "Area Planners" meetings; however, none of these networks meet with the others. In the Waterloo area, the "It's About Time" network is developing in response to the need for more co-ordination by providing a formal mechanism through which the network's members can meet regularly (McMillan, 1989, pers. comm.); informal communications also occur as a result of membership overlaps, since employees move around among these organizations.

In terms of the overall patterns of communication in the watershed, however, it is suggested by this researcher that this pattern among the human heritage agencies of selective networking may not necessarily be a weakness; rather, it could be considered as a straightforward fulfilment of the need for like agencies to concentrate their efforts on strengthening cohesion among themselves. This would need to be confirmed through a more detailed follow-up inquiry into possible measures for improving communications.

Nature, Extent, and Formality of Information Produced by Each Actor

Natural Heritage (Map 1)

With the exception of the OMOE, the NHL, and the GRCA, none of the interviewees had a formal communications strategy or information office to guide interactions with either the general public or other professionals. The OMOE has a separate Communications Branch based in Toronto which is mainly concerned with dealing with the public, rather than with other professionals involved in natural heritage.

The NHL's Natural Heritage Stewardship Program (NHSP) is itself a communication strategy aimed at educating private landowners about the protection of environmentally significant areas, and is therefore somewhat different from the other agencies. Its *raison d'être* is to co-ordinate information on resources offered by various agencies involved in natural heritage and to communicate this information to those members of the general public who are private landowners (Moull, 1989, pers. comm.).

The GRCA has its own well-developed Information Services office responsible for communications with the general public. It is the only agency to use a wide variety of printed, visual and other communication tools--for example, brochures series, booklets, library resources, exhibits, videos, slide presentations, speaking engagements, tours, and nature centres. Although the GRCA does not have a formal strategy for communicating on a technical level with the staff of other agencies, it has a relatively strong network--compared with the reports from the other interviews--with non-government groups, partly because of its high public profile as an information source. It also has a strong network with government agencies mainly due to its legislated authority to co-ordinate human activities on floodplains throughout the watershed.

The remainder of the people interviewed for natural heritage (8 out of 11, or approximately 70%) report that their agencies communicate on an ad hoc or informal basis and so are limited in extent to the publication and/or distribution of occasional pamphlets for general consumption by an audience limited (for the most part) to the municipality within which the agency is located. The Brantford Waterfront Advisory Committee (BWAC) and The

Arboretum are the only ones to use slide presentations—BWAC has one information package, and The Arboretum presentations depend upon the efforts of individual members. These two organizations are also the only ones to use other means of reaching out to the public. The Arboretum has a program of educational activities and occasional lectures, and the BWAC has an annual Riverfest celebration. Apart from these exceptions, contact between the agencies and the general public reportedly occurs as a reactive process, with the agencies responding to requests for information from members of the public. The reasons cited by all interviewees for the limited communications were the lack of money and staff time to improve the co-ordination and distribution of information.

Human Heritage

Among the organizations involved in human heritage, the OMCC plays a strong co-ordinating role for the LACACs in the Waterloo region; its activities include circulation of technical information, organization of professional workshops, publication of directories, calling of meetings, etc. (Sosnoski, 1989, pers. comm.). However, little of the information generated by these human heritage agencies gets out to the general public, possibly because most of the communications energies are directed primarily towards related organizations. The production and accessibility of information by the individual LACACs varies from area to area, depending on the financial and human resources available (Sosnoski, 1989, pers. comm.).

Woodside National Historic Park has a formal communication strategy in the form of the Visitor Activities (VA). The VA Co-ordinator is responsible for dealings with the general public and educational activities. With respect to the rest of the museums and galleries network in the Waterloo region, they meet on a regular monthly basis; their efforts so far have focussed on co-ordinating advertisement of special events, the distribution of information about the network's members to the general public, and other methods to create a higher, more united public profile. However, apart from this, little communication, formal or informal, occurs with agencies outside of this network (McMillan, 1989, pers. comm.).

Overall Strengths and Weaknesses of Current Communications Patterns

Based on the foregoing information obtained through the interviews, the overall picture appears to be as follows:

Natural Heritage

- + the GRCA has the most active interactions and uses the most number of communications tools with both the general public and with professionals
- none of the organizations involved in natural heritage protection appear to interact regularly with each other outside of the GRCA
- + the exception to this is the group of municipal planners in the RMW
- approximately 70% (8 out of 11) of the organizations do not have the means available for taking a pro-active approach to communicating with the general public or with other professionals
- the north end of the watershed appears to have little activity in terms of protecting natural heritage (Veale, 1989, pers. comm.; Beaumont, 1989, pers. comm.)

- towards the southern end of the watershed (Paris, Brantford, and on), there also appears to be less concern for, and therefore less communication about, natural heritage than in the central section (Debbert, 1989, pers. comm.; Sinclair, 1989, pers. comm.)

Human Heritage

- + there appear to be at least two selective networks in operation which utilize both formal and informal means of communication, one made up of organizations concerned with architectural features, and the other made up of museums and galleries
- + the architectural network (mainly LACACs) is drawn together in the Waterloo region through the OMCC (Kitchener district)
 - however, it does not have strong links to the general public
- + the museums and galleries in the Waterloo area have drawn together on their own initiative; their main goal is to increase their interactions with the general public

PLANNING

Several of those interviewed voiced the belief that the basic need is for a mechanism to co-ordinate and circulate information on resources that currently exist for human and natural heritage protection. The suggestions offered to the interviewees, and accepted by them, as to where the initiative should come from include the following:

- that municipalities should realize their potential to act as central resource agencies and to co-ordinate all relevant organizations currently operating within their boundaries
- that the provincial ministries should take the lead role to co-ordinate information on all existing agencies and the resources available for human and natural heritage protection
- that the GRCA should take the lead role to co-ordinate existing resources for human and natural heritage protection in the Grand River basin
- that smaller networks of like agencies should be formed and encouraged to develop independent of any government body.

Some of the means suggested to the interviewees, and accepted by them, for improving communications include:

- encouragement of each agency to develop its own role as an educator
- the holding of regular meetings (for example, once every 2 months) of like agencies in order to bring them together OR the holding of regular meetings of all agencies involved in heritage in order to bring them together
- circulation throughout the watershed of directories of contacts for the various organizations involved in heritage protection
- appointment by the GRCA of a Heritage Co-ordinator
- the formation of a Citizens' Forum.

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PERSONAL COMMUNICATIONS

- Ambrose, J. Botanist, The Arboretum, University of Guelph, Guelph, Ontario.
- Beaumont, R. Manager of Information Services, Grand River Conservation Authority, Cambridge, Ontario.
- Carleton, D. Resource Planning Technician, Cambridge District, Ontario Ministry of Natural Resources.
- Curtis, K. Planner, City of Kitchener, Kitchener, Ontario.
- Debbert, B. Town Planner, Paris, Ontario.
- MacDonnell, L. Acting Director, Cambridge District, Ontario Ministry of the Environment.
- MacKay, S. Member, Kitchener-Waterloo Field Naturalists, Waterloo, Ontario.
- McMillan, K. Acting Superintendent, Woodside National Historic Park, Kitchener, Ontario.
- Moull, T. Department of Land Resource Sciences, University of Guelph; Natural Heritage League Landowner Contact Program.
- Roth, D. Senior Planner, City of Waterloo, Waterloo, Ontario.
- Sinclair, M. Co-ordinator, Waterfront Advisory Committee, Brantford, Ontario.
- Sosnoski, G. Assistant to the City Clerk, City of Kitchener, Kitchener, Ontario.
- Thorsen, S. Commissioner of Planning, Regional Municipality of Waterloo, Waterloo, Ontario.
- Veale, B. Policy and Research Planner, Grand River Conservation Authority, Cambridge, Ontario.

APPENDIX A

Interview Guide

Main Organizations and Communication

1. Who do you consider to be the main actors/organizations in the Grand River basin? (for both natural and human heritage conservation)

Why do you consider them to be major actors?
2. In what ways, for what reasons, and how frequently do you communicate with them?
3. What do the other major organizations produce in terms of information? do you use this information? how? could it be improved?

Information

4. Do you have a communication strategy or plan?
5. Do you have an information office/officer? do you have advisory committees? technical committees? other means of getting information from the public? how often do these committees meet? who sits on them? are minutes kept?
6. Do you have a publications program? what do you publish? how often? how many? for whom?
7. Do you have a visual productions program? what do you produce? how often? how much? for whom? how is it financed?
8. Do you offer open houses, information sessions, lectures, or other means of disseminating information to the public?
9. Do you attempt to communicate or network regularly with supporter client groups? how would you describe the characteristics of this network program?
10. Overall, what would you consider to be the strengths and weaknesses of current communications among heritage actors? what would you improve? how?

APPENDIX B

**Member Organizations of
"It's About Time"**

Brubacher House
Doon Heritage Crossroads
Earth Science Museum, University of Waterloo
Guelph Civic Museum
Homer Watson Gallery
Joseph Schneider Haus
Macdonald Stewart Art Centre
McCrae House
Museum and Archive of Games, University of Waterloo
Museum of Visual Science and Optometry, University of Waterloo
The Clay and Glass Gallery
The Library and Gallery, Cambridge
The Seagram Museum
University of Waterloo Arts Centre Gallery
Waterloo Art Gallery
Wellington County Museum and Archives
Woodside National Historic Park

TABLE 1
Agencies Interviewed

Natural Heritage

Brantford Waterfront Advisory Committee
Grand River Conservation Authority
Kitchener Planning Department
Kitchener-Waterloo Field Naturalists
Ministry of Natural Resources
Ministry of the Environment
Natural Heritage League
Paris Planning Department
Regional Municipality of Waterloo Planning Department
The Arboretum, University of Guelph
Waterloo Planning Department

Human Heritage

Kitchener LACAC
Kitchener Planning Department
Paris Planning Department
Regional Municipality of Waterloo Planning Department
Waterloo Planning Department
Woodside National Historic Site

Respondents from:	Woodside	GRCA	MNR	MOE	RMW Planning	Waterloo Planning	Kitchener Planning	Paris Planning
Extent of Interactions with other agencies regular meetings	1	1			1	1	1	
contact through commenting process of dev. proposals		1	1	1	1	1	1	1
call on others for resource info		1			1			
called upon by others as info resource		1			1		1	
infrequent contact with others outside of commenting proc.			1	1			1	1
receive info from other agencies?	Yes	Yes	No	No	Yes	Yes	Yes	No
Do you have a communications strategy?	Yes-Visitor Activities	Yes-Info. Services	No	Yes	No	No	No	No
Information Office?	(above)	(above)	--	Yes-Toronto-based	--	--	--	--
Advisory Committees?	--	Yes	--	--	EEAC	--	--	--
Publications? Regular (R) Adhoc (AH) brochures	R	R	AH	AH	AH	--	--	--
studies/reports		R	AH	AH	--	--	--	--
Visual productions? Regular (R) Adhoc (AH) videos		R	--	--	--	--	--	--
films		R	--	--	--	--	--	--
slides	AH	R	AH	--	--	--	--	--
Other means of soliciting info from the public?	--	Yes*	--	--	--	--	--	--

* workshops, speaking engagements, tours, library resources, exhibits, nature centres

TABLE 2 Continued . . .

Respondents from:	BWAC	Kitchener LACAC	The Arboretum	NHL	K-W Field Naturalists	TOTAL (both pages)
Major Actors						
<i>Natural Heritage:</i>						
GRCA	1		1	1	1	10
MOE			1			7
MNR			1	1		9
OMAF			1			5
developers						1
landowners				1	1	3
general public					1	2
municipalities					1	7
naturalists groups			1			2
The Arboretum			1			1
FON					1	1
BWAC	1					1
<i>Human Heritage:</i>						
It's About Time						1
Min. Tourism						1
RMW						2
MCC		1				2
LACACs	1	1				5
Waterloo Regional Heritage Foundation						1
Ontario Heritage Foundation		1				2

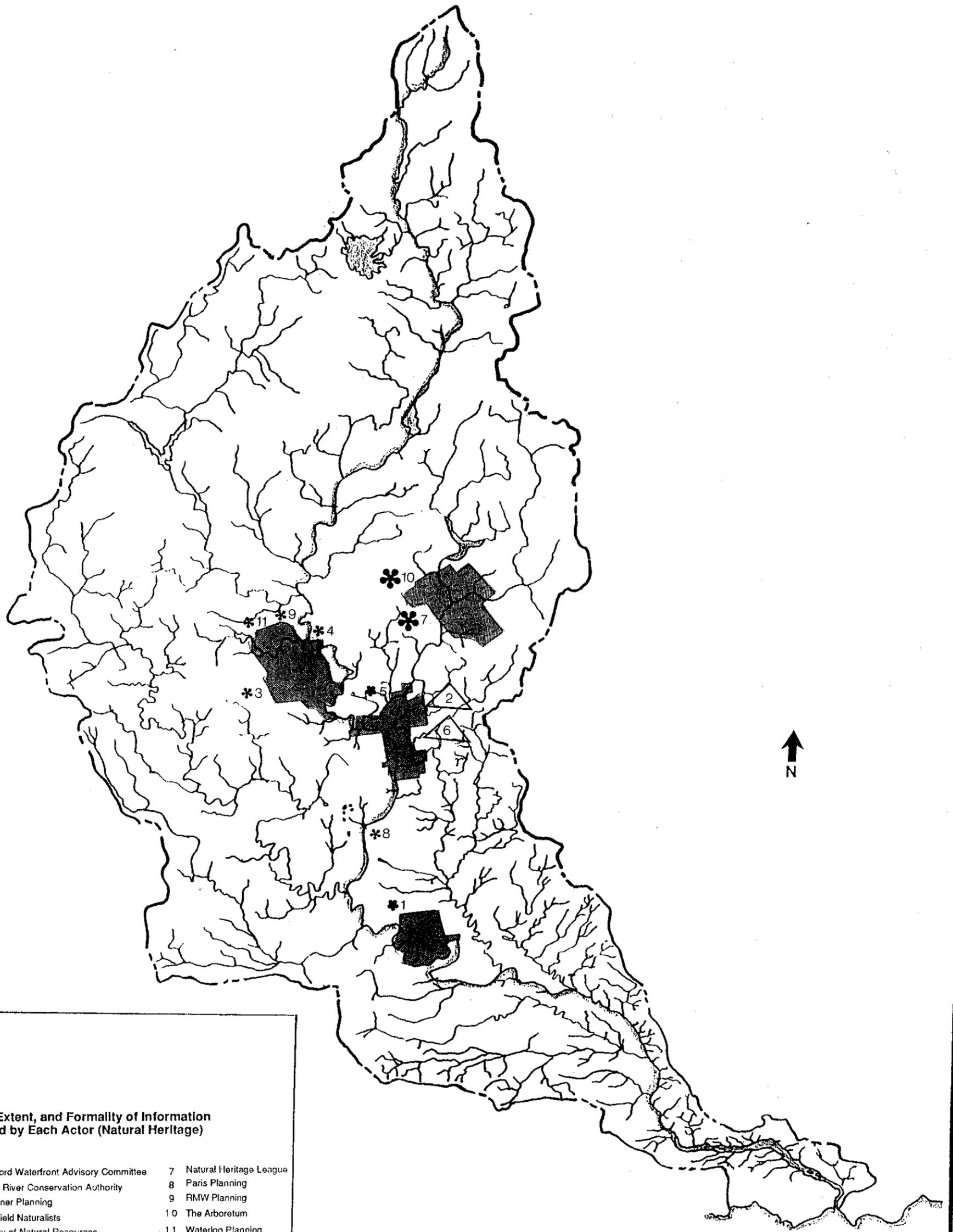
Respondents from:	BWAC	Kitchener LACAC	The Arboretum	NHL	K-W Field Naturalists	TOTAL (both pages)
Extent of Interactions with other agencies regular meetings		1				6
contact through commenting process of development proposals	1					8
call on others for resource information				1		3
called upon by others as info resource		1	1	1		6
infrequent contact with others outside of commenting process for dev. proposals	1	1	1	1	1	9
receive info from other agencies?	No	Yes	No	Yes	No	Yes - 3 No - 10
Do you have a communications strategy?	No	No	No	Yes- NHSP	No	Yes - 4 No - 9
Information Office?	No	No	No	--	--	Yes - 3 No - 10
Advisory Committees?	--	--	--	--	--	2
Publications? Regular (R), adhoc (AH)						Regular - 5 Ad Hoc - 4
brochures	AH	R*	R	R+	R+	None - 4
studies/reports	--	AH	AH	AH	--	R - 1; AH-5 None-1
Visual productions? Regular (R), adhoc (AH)						Regular - 1 None - 12
videos	--		--	--	--	
films	--	--	--	--	--	R - 1; 0 - 12
slides	AH	--	AH	--	--	R - 1; AH - 2; 0-8
Other means of soliciting info from the public?	--	--	Yes**	--	--	Yes - 2; No - 11

* self-guided walking tours

+ Newsletter

** occasional lectures and workshops

THE GRAND RIVER VALLEY



Map 1

LEGEND

Nature, Extent, and Formality of Information Produced by Each Actor (Natural Heritage)

- | | |
|---|---------------------------|
| 1 Brantford Waterfront Advisory Committee | 7 Natural Heritage League |
| 2 Grand River Conservation Authority | 8 Paris Planning |
| 3 Kitchener Planning | 9 RMW Planning |
| 4 K-W Field Naturalists | 10 The Arboretum |
| 5 Ministry of Natural Resources | 11 Waterloo Planning |
| 6 Ministry of the Environment | |

△ Agencies with an info strategy + regular publications + regular visual productions + other tools

* Agencies with regular publications + ad hoc visual productions

▲ Agencies with ad hoc publications + ad hoc visual productions

★ Agencies with ad hoc publications



MAP 1

01/2

A Geographic Information System for Monitoring, Planning and Managing Heritage Resources

David A. Balser

CONTEXT

Several trends have coalesced to indicate the need for an information system capable of tracking the changes in heritage resources and land use generally in the Cambridge to Paris node. Given the complex nature of the area, in both natural and human terms, it is not surprising that the institutional arrangements which govern it have also become quite complex. Agencies involved with the planning and management of the area find it increasingly difficult to integrate and co-ordinate their efforts. What is missing is a common framework on which to build an understanding of the area and to share ideas. A recent technological innovation, the geographic information system (GIS), can help provide this framework, in the spatial and visual form which planners, managers, and researchers are used to dealing with.

A GIS is an integrative tool. There is a growing realization in government and academic circles, and among conservation organizations, that traditional approaches to the conservation of heritage resources are too site-specific. In an area like Cambridge-Paris, there is such a wealth of significant natural features that programs designed to protect a certain class of features, such as ANSIs or wetlands, cannot hope to protect the unique qualities of the landscape in which they are embedded. Landscapes are systems; one cannot manage the whole by concentrating on only a few of the parts. This means that some type of over-arching assessment, monitoring and planning is needed for the whole landscape unit, otherwise there is sure to be a gradual erosion of the integrity of the fabric of the landscape itself. This is especially true of natural heritage features, which are not islands unto themselves but subunits of a landscape system with which they are constantly exchanging energy, nutrients, and wildlife.

PATTERNS

From the maps depicting significant natural areas in the Cambridge to Paris node, one can immediately see that the combination of programs to protect natural areas has created considerable overlap. Some areas, such as the Grand River Forest, are designated as an ANSI, ESA, Carolinian Canada site, significant wetland, as well as being a GRCA regulated area. Naturally, none of the boundaries of these designations coincide.

The highly varied topography of the region has influenced the pattern of land clearance. An abundance of natural areas remain, exhibiting a surprising variety of ecosystem types. There are upland maple-beech and oak-hickory forests, swamp and floodplain forests, bogs in kettle depressions, perched fens, and small remnants of tall-grass prairie and oak savannah. Despite the high concentration of natural areas, many are still relatively isolated. Dominating the area is the Grand River Forest, which runs for 20 km in an almost unbroken

stretch along the river. The possibilities for enhancing the connectivity of the area are good, as the tributary streams tend to run perpendicular to it, in the manner of ribs to a spine.

CONSTRAINTS

On top of the natural complexity of the area is superimposed considerable administrative complexity. This combination of interests from provincial agencies, local planning authorities, county and regional planning authorities, plus the GRCA, creates an administrative system which can be confusing and difficult to co-ordinate. None of these institutions has a mandate to oversee activity in the area; each one tends to restrict itself to its own jurisdiction, making it difficult to consider innovations in planning.

Although the system of plan development application review is intended to keep all relevant parties informed about potential land use conflicts, one must question the effectiveness of this arrangement. The sheer volume of proposals requiring consideration makes strategic planning difficult, and increases the likelihood that small, incremental intrusions on natural areas will not be dealt with.

Compounding the problem is the difficulty in collecting and disseminating up-to-date information. Developments come and go, the status of areas changes, new scientific data are constantly being collected, and the concerns of residents and other interested parties are also constantly shifting. Under the circumstances, it is virtually impossible for any agency to keep track of the "big picture". This is where a GIS can be most helpful.

PLANNING

A geographic information system (spatial database) is virtually a technical prerequisite to facilitating many of the initiatives for bringing a more coherent and effective institutional response to heritage planning and management in the Cambridge to Paris area.

A GIS is more than an electronic map file. It allows computerized storage of spatial data (and associated information) in "layers" analogous to the transparent overlays used in manual mapping techniques. Any kind of spatial data can be included, regardless of the scale or projection of the original maps, as long as the resolution of the layers is commensurate. This means that it is no longer necessary to select a scale at which all work will be done; only the necessary level of detail need be considered so that data are neither too fine nor too coarse to be useful. Examples of potential layers in a GIS database would be: physiography, soils, vegetation, rare species, significant areas, zoning, development stresses, potential rehabilitation areas, aggregate resources, water quality, day use recreation potential or demand, property boundaries, land values, private stewardship agreements, and so on.

More importantly, a GIS allows relationships between layers to be explored. For example, the computer can map, correlate, and do area analysis on combinations of features, such as prairie communities in relationship to ANSI designation or covered by private stewardship programs in areas zoned for agriculture on land valued at more than \$5000 per ha. Since the data are stored in digital form, they can be easily updated and corrected.

In order to understand what a GIS is and how it works, consider a typical problem in heritage planning: how many hectares of natural environment should be available to the public for naturalist activities, such as nature appreciation, bird watching, wildflower photography, and so on? To answer this question with a GIS, one would first build up a database of available resources: the spatial extent of existing natural areas classified by community type, and

containing relevant attributes of each area, such as rare species, ownership, or coverage by existing programs. One would then begin building a "model", incorporating certain constraints, such as the capacity of these areas to support recreational use, those off-limits to the public, the type of area most in demand, accessibility, seasonal use factors, impact on wildlife or other sensitive features, areas reserved for scientific use, and so on. Various scenarios could be modelled; for example, what if demand doubles in 20 years? What if the land available shrinks by 50% in 20 years? Or both? There are many permutations of these and other questions which can be readily dealt with using a GIS and are virtually impossible to do otherwise.

Before any agency, working group, committee or academic study can begin to assess the complexities of the current situation and explore alternatives, a common information system is essential. A GIS provides this in the spatial framework with which land resource agencies are familiar. It provides a "common language" among different actors in the system, enabling them to better understand how the system works, and to explore innovative means of maintaining its integrity as a special landscape.