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Centre des ressources du patrimoine

The Grand as a Canadian Heritage River

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University of Waterloo

***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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Preface

One of the prime functions of the Grand River Conservation Authority under the Conservation Authorities Act is to manage the natural resources of the Grand River valley. As development proceeds within the river valley and pressure on the resource base is augmented, the need for strategic planning is apparent.

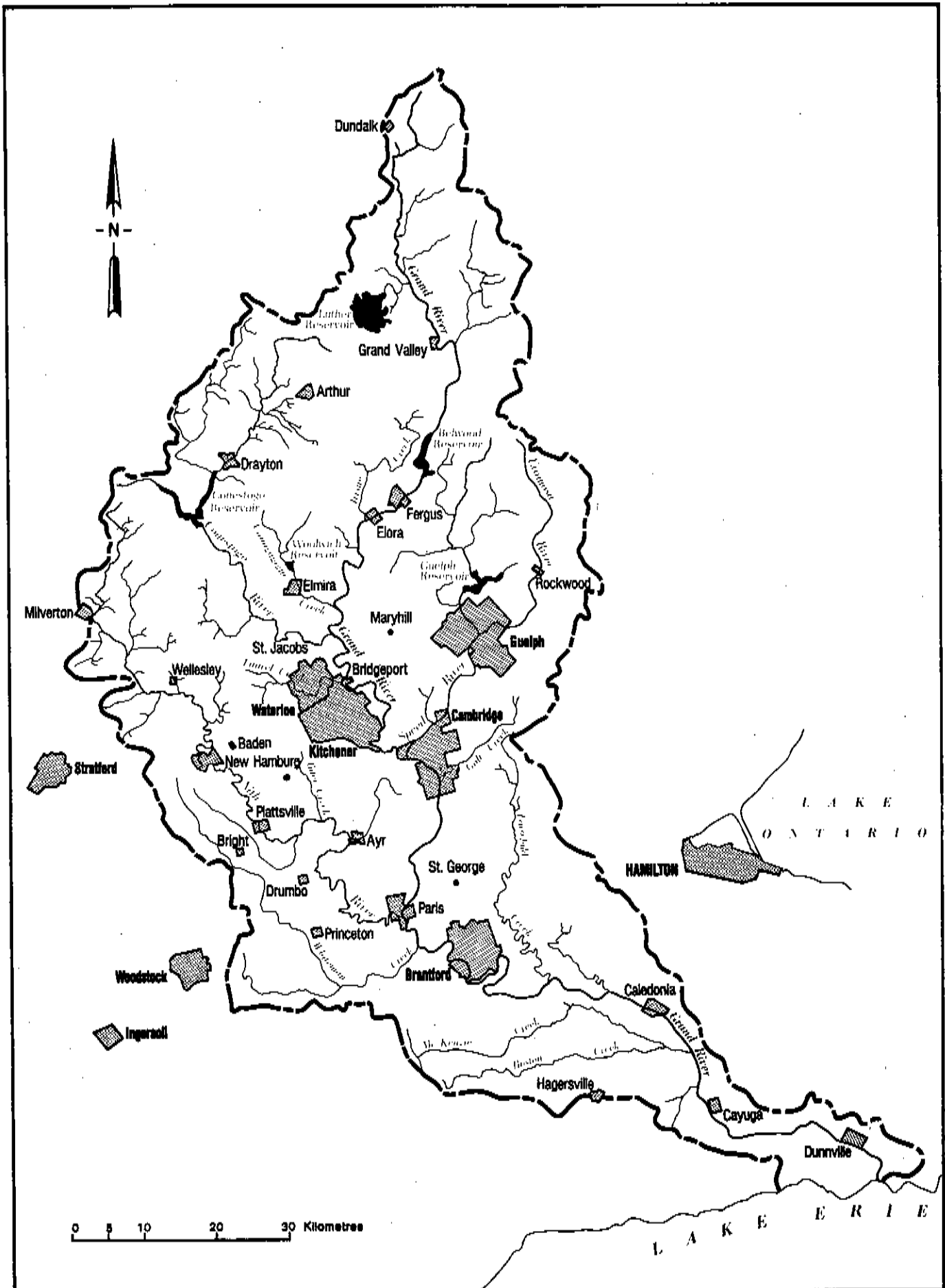
The Authority promotes an integrated and consistent planning approach which recognizes the natural and cultural heritage resources and recreational potential of the river valley on a watershed basis. This approach will be reflected in the Authority's resource management plan, which is currently being updated during 1988-89.

Before an integrated and consistent approach to resource use can be achieved, an investigation is necessary of the existing heritage and recreational resources, their significance, and related issues predominant in the valley. In recognition of this need, the Grand River Conservation Authority has supported the Canadian Heritage Rivers concept which encourages studies to be carried out to identify the outstanding qualities of a river valley.

Through the Grand River Heritage Study an opportunity has been provided for undertaking a comprehensive inventory of heritage resources within the valley and for determining their significance on a national, provincial and local level. This information will be used by the Grand River Conservation Authority, in consultation with its member municipalities, to prioritize resource issues and needs.

Based on the information collected by the study team regarding heritage resources, it is apparent that the Grand River valley offers heritage and recreational resource opportunities which are outstanding at a national level. Should the outstanding features identified by the study team warrant designation of the Grand River as a Canadian Heritage River, the Authority's revised resource management plan will reflect the national stature of the river system and provide a comprehensive planning framework for all resource planning agencies within the watershed.

*G.M. Coutts
General Manager
Grand River Conservation Authority*



Location map of the Grand River basin.

THE GRAND AS A CANADIAN HERITAGE RIVER

Introduction

The papers in this volume tell us much about the heritage of the Grand River. The studies began in March 1988 as part of a project to determine if the Grand might qualify as a Canadian Heritage River under the guidelines of the Canadian Heritage Rivers Board. To do so the Grand would have to be found outstanding on natural, human or recreational grounds, among other leading rivers of the country such as the Athabaska, the St. Croix and the Saguenay. Eight researchers collected and analyzed information needed to determine whether the Grand merits this status. The results are presented in the background papers in the second section of this report. The first section of the report interprets these background papers and information collected at public meetings and in various other situations and makes the case for the Grand as a Canadian Heritage River. Indeed the Grand is considered to be deserving of Canadian Heritage River status on all three basic grounds, i.e. because of its outstanding natural, human and recreational characteristics. The Grand also has strong potential for tourism and so for both development and conservation of heritage resources.

Two other steps are needed to gain Canadian Heritage River status for the Grand. The first is the preparation of a Nomination Document and the second a Management Plan, both to be submitted to the Canadian Heritage Rivers Board. This plan would be produced entirely by the agencies, groups and people in the Grand River area. No prior regulations apply to a Canadian Heritage River other than those approved in this Management Plan.

It is our hope that the information in this volume will attract support from people within and without the Grand River area for the establishment of the Grand as a Canadian Heritage River. Canadian Heritage River status would have many values. It would mark the river as special and lead to more care in its development, use and conservation. It would give the river an image attractive for tourism and related uses. It would help conserve water quality, vegetation, wildlife, historic structures, beautiful areas, and other elements of importance to a high quality of life now and in future. It would make the river more useful for education and for general appreciation and use by the people.

It would not have been possible to prepare this volume without much help from many people. John Carruthers did much of the early preparatory work while at the University of Waterloo as the Heritage Resources Centre Program Co-ordinator. Nick Coomber (Canadian Parks Service), Rick Phillips (Ontario Ministry of Natural Resources) and Mac Coutts (Grand River Conservation Authority) were very helpful as members of the Grand River Heritage Study Steering Committee. Norm Richards (Director, Parks and Recreational Areas Branch, Ontario Ministry of Natural Resources) and Jim Bauer (Chairman, Grand River Conservation Authority) gave strong assistance at a number of key points. The members of the research team performed above and beyond the call of duty. Edith Fuller (Mayor, Town of Haldimand) helped in many ways. Ken Seiling (Chairman, Regional Municipality of Waterloo), Christina Weylie (Alderman, City of

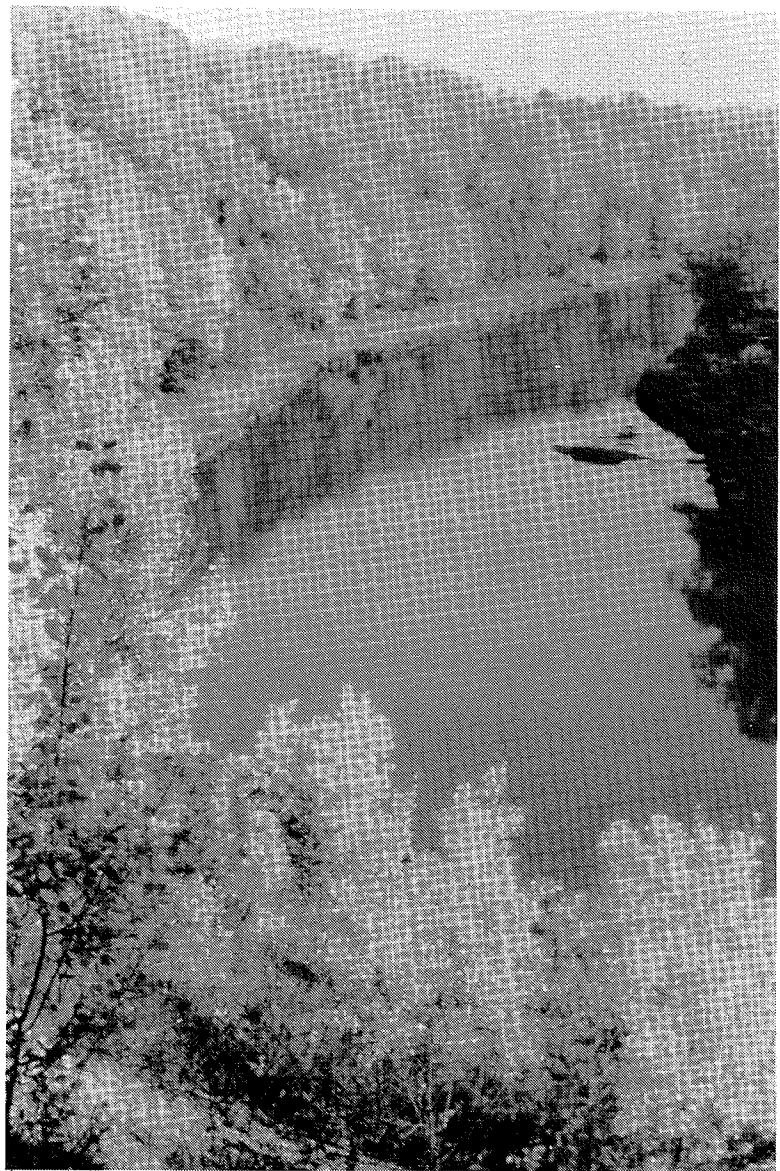
Kitchener) and Mary Welsh (Brantford) offered useful advice and help, as did Brad Ward (Chairman, Brantford Waterfront Advisory Committee). Barb Veale and Wayne McMillan of the Grand River Conservation Authority assisted with meetings, general support, co-ordination and review of papers, as well as provision of information.

It is not possible to thank everyone individually, but the people consulted by the members of the research team are acknowledged in the references following each background report. We are very grateful to all who helped and took an interest, for example, the many people who attended the open houses, public meetings, lectures or consultations which were a large part of the public participation underlying this work. We are most grateful to the Canadian Heritage Rivers Board, the Grand River Conservation Authority, and the Waterloo Regional Heritage Foundation for financial support and for the opportunity to do this work. Finally, the photographs in this volume have been provided by Chris Hart, Larry Lamb, and the Grand River Conservation Authority. Thanks to all!

J.G. Nelson
Study Director

The Case for the Grand as a Canadian Heritage River

J.G. Nelson
Study Director



INTRODUCTION

A river creates and sustains the land and the people in its watershed. Its waters flow across the land, wearing, moving and depositing gravel, sand, silt and clay, reworking less congenial rocks and sediments, such as the hard drift left by ancient ice. A river shapes the land for plant and animal growth. The valley is the centre of its activities. There it creates the floodplains and the slopes upon which valued forests, habitats and natural systems develop. The soils in the valley are often unusually fertile and useful for agriculture. The river waters are home for fish and the source of water power and other support for manufacturing and industry. The water purifies the wastes of human action. The river also provides a playground for man and an aesthetic setting for quality of life. Yet a river and its flow, its erosion and other effects, do change over the seasons and the years.

Rivers are dynamic and must be adjusted to by humans, without excess damage to the environment, the resource base and development opportunities. There appears to be a rough balance between the natural work and character of a river and the effects that it can tolerate without changing so as to threaten life. We must therefore think deeply about, and carefully plan for the future management of a river such as the Grand. A good place to start is with the natural and cultural heritage of this river and its valley.

PURPOSES

More specifically this study of the Grand River Valley has been undertaken for two basic reasons. The first is to determine whether the river valley has the outstanding qualities required to be designated as a Canadian Heritage River along with other famous streams such as the French in north central Ontario or the Clearwater in Saskatchewan. The second is to collect and organize information on heritage generally for use by the Grand River Conservation Authority (GRCA) and other government agencies and private groups in the day-to-day planning and managing of the Grand River. The study is also intended to increase awareness, understanding and appreciation of Grand River heritage among students in the schools and universities and the people living and working in the area.

In this study the term heritage is used in a broad sense to include plants, wildlife, and other aspects of nature as well as old mills, factories, canals or other aspects of human heritage. The history of Indians, Mennonites, Loyalists and other peoples is of interest as are commercial, religious and other ideas and activities of the past. These historic messages can be seen as guidelines telling us where we have come from and where we might be going in future.

BACKGROUND

The Grand River Heritage Study (GRHS) was commissioned by the Canadian Heritage Rivers Board (CHRB) and the Grand River Conservation Authority. The study is one of the heritage inventories that the Board and concerned provincial and local groups are supporting across Canada in order to identify outstanding Canadian rivers and give them special recognition, planning and management in keeping with their national stature. In this Grand River inventory, additional assistance was provided by the Waterloo Regional Heritage Foundation through an award of a research scholarship to a member of our research team, and by the University of Waterloo which provided staff time and some

space to assist with the work. The study was conducted by the Heritage Resources Centre of the University of Waterloo.

THE CANADIAN HERITAGE RIVER PROCESS

An inventory study like this one for the Grand is the first step in the process followed by the Canadian Heritage Rivers Board in determining whether a river has the outstanding qualities to become a Canadian Heritage River. The inventory includes information on the natural and human heritage in the sense discussed previously. The inventory also includes data on the recreation qualities of the river because recreation and tourism are seen as appropriate ways in which heritage rivers can be used and enjoyed by the people. In other words natural heritage, human heritage and recreation are the three broad categories or criteria upon which information is collected to determine if a stream has the outstanding characteristics to become a Canadian Heritage River. To attain this status, a river need qualify under only one of the three categories.

If the inventory seems promising then the second step in the Canadian Heritage River process is to prepare a nomination document. This summarizes the inventory information and makes the case for heritage river status. The preparation of a nomination document is the next step for us in our Grand River work.

The third step in the Canadian Heritage River process is the preparation of a Management Plan for the river. A river can be approved in principle for Canadian Heritage River status but cannot be confirmed by the Board until a Management Plan is completed. All the major concerned agencies, groups and individuals in the river valley should be involved in the preparation of this Plan.

The Management Plan is a very important document which specifies how activities will be administered by agencies, groups and people along the waterway in order to appropriately use and protect the outstanding qualities for which it is designated. In this connection it is also very important to realize that designation as a Canadian Heritage River does not bring any specific standards or regulations for either use or conservation. In other words the Canadian Heritage River designation does not impose any water quality, land use planning or other requirements of its own. Any regulations, guidelines, policies, or other institutional or management arrangements for the use and protection of the river's heritage are prepared by the agencies, groups, and people in the valley as part of the Management Plan. Many of the arrangements in such a Plan may already exist, as would be the case in the Grand River valley as will be shown later in this report.

VALUES

Given the foregoing circumstances it might well be asked, "What are the values of Canadian Heritage River status?" The first surely is that the designation increases awareness of the natural and human heritage and the recreational and tourism potential of a river.

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 primarily for water supply, or other development purposes. People have expressed concern about this state of affairs at the open houses and other meetings which we have held as part of the study since it began in March, 1988. Many people at these meetings expressed appreciation for the information that we have presented on the Grand and asked for more. Many people

have also expressed support for stronger efforts to protect the natural and human heritage of the Grand, especially at this time when accelerated development in some areas seems to be threatening what has come from the past. Other persons are concerned that the recreational, 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.

Designation as a Canadian Heritage River not only will make local people more aware of the heritage values of the Grand and the need to appropriately use and protect them, but it will increase knowledge of the river in other places. It should help to attract more outside visitors to the Grand River watershed.

Designation of the Grand as a heritage river will also promote more co-operation among residents in the different regional municipalities and local governments throughout the watershed. It will prompt local governments to work more closely with citizens' groups, the GRCA, and federal and provincial government agencies, as well as private businesses, in planning for appropriate use and protection of the heritage resources and features along the river valley. Some of this co-operation is going on now, notably for water supply, flood control and other purposes. But it should be extended to other aspects of the environment and economy, including those to do with heritage.

Another prime value of Canadian Heritage River status is education. Reports and other information prepared for designation as well as for 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.

Another prime value of designating a river like the Grand as a Canadian Heritage River is the increase in enjoyment and quality of life that it will bring. Outstanding heritage sites will become better known, more widely used, and the citizens better informed. The recreation and leisure time of citizens will be enriched. The basis for a higher quality of life will be identified and heritage resources more wisely used and protected through management planning.

STUDY APPROACH

This study began in March, 1988, after about one year of negotiation with the Canadian Heritage Rivers Board, provincial government personnel, representatives of the GRCA and interested citizens notably from the southern reaches of the river. A wide ranging consultation process was developed which focussed on three open houses held in Caledonia, Kitchener and Fergus in early June, 1988. Various visits and presentations were made to groups such as the Inter-Municipal Tourism Committee and the Cambridge Flood Control Advisory Committee. Another major public meeting was held on October 6 and 7 at the University of Waterloo.

Eight research assistants worked with the study director to collect and analyze information on Grand River heritage and recreation.

This information was organized into the following specific categories:

- 1) abiotic and geologic, ie. bedrock, landforms, glaciation and the like;
- 2) biotic, i.e. vegetation and animal life;
- 3) water quality;

- 4) human heritage with special reference to native peoples, the watershed's cultural mosaic, and industrial history;
- 5) Six Nations - past and present;
- 6) recreation and tourism;
- 7) parks and protected areas;
- 8) Grand River valley trail systems;
- 9) development stresses; and
- 10) heritage management arrangements.

This information was collected and analyzed in general accordance with a research system known as the ABC method. A, B and C refer to a comprehensive attempt to understand the abiotic (geologic), biotic and cultural resources of an area by describing and mapping them in terms of patterns. These patterns include the roads, buildings, or other artifacts or structures found on the ground in the study area. These patterns also refer to processes or consistent ways of doing things such as erosion or flooding in the natural sense or transport or manufacturing in the human sense.

In the ABC method, the various natural and human resources and patterns are also studied and mapped in terms of significance and constraints for use and conservation. In other words "In what ways are natural and human patterns valuable or inhibiting to heritage planning and management?" Furthermore, "What planning issues can be identified for attention in a Management Plan?"

The large amount of information collected by the research team is presented in detail in the individual reports more or less according to this ABC approach. Thus, for each topic, information is given on context, patterns, significance, constraints and management issues. A large part of the information is very relevant to watershed or basin heritage, recreation, and tourism planning and management and should be read and considered in detail in that regard. Much of this information is also relevant to the question of whether the Grand River merits Canadian Heritage River status. It is this question to which the rest of this summary is primarily devoted.

In this connection it is important to note that the Grand River has been found to have outstanding characteristics in previous studies. An example is the study by Cathexis Associates in 1987 to assess the rivers in Ontario to determine priorities for nomination to the Canadian Heritage Rivers System, according to the CHRS selection guidelines. In this study 193 waterways or waterway segments were evaluated for natural heritage, human heritage and recreational values. The Grand River was found to rank 8th of 11 rivers judged to have outstanding heritage values (Table 1).

In 1974, a book on the leading Rivers of Canada by the Canadian author, Hugh MacLennan, was published by MacMillan Company, Toronto. The Grand was one of the rivers discussed in this volume, along with streams such as the St. Lawrence, the Ottawa, the St. John, the Miramichi, the Niagara, the Red, the Saskatchewan, the Saguenay and others. The Grand was found to be of interest primarily on human or historical grounds, i.e. in terms of Indian history and its record of settlement from the United States and Europe.

RESULTS

The reports by the eight members of the GRHS team reveal the Grand River Valley 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

TABLE 1

Rivers With Outstanding Heritage Values

River	Outstanding Heritage Values *		
1. Missinaibi R.	H	R	N
2. Trent-Severn R.	H	R	N
3. Albany R.	H	R	N
4. Ottawa R.	H	R	N
5. St. Lawrence R.	H		N
6. Madawaska R.		R	N
7. French R.	H	R	
8. Grand R.	H		N
9. Mississippi R.		R	N
10. Rideau W.		R	N
11. Severn R.		R	N

* H = Human Heritage
 R = Recreational Value
 N = Natural Heritage

Source: *Revised Heritage Rivers Evaluation Project* prepared for the Parks and Recreational Areas Branch, Ontario Ministry of Natural Resources (Cathexis Associates, 1987).

provincial or national basis. This heritage and these opportunities are rare in Ontario or in Canada, or they are representative of aspects of our natural and human history which have been recognized as provincially or nationally significant by appropriate 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 Reserve; the giant potholes worn in bedrock at Rockwood, east of Guelph; or the Carolinian forests at Spottiswood Lakes, or other sites along the Grand, south of Cambridge. Details on these local and regional as well as provincially and nationally significant features are listed in the various reports that constitute this study, for example the reports on human heritage and on biotic heritage.

Among this kaleidoscope of heritage features and recreation and tourism opportunities are some which are sufficiently outstanding to make the case for the Grand as a Canadian Heritage River. These outstanding features are natural, human and recreational in kind. In other words the Grand River Valley is considered to qualify for Heritage River status in terms of all three of the basic criteria used by the Canadian Heritage Rivers Board.

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 Wisconsin ice some 12,000 years before the present (B.P.). Along the course of the river valley are found examples of the major landforms resulting from glaciation. These include: extensive poorly sorted clay, sand and gravel deposits or till and undulating fields or ground moraine in the north; hummocky 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 the sequence or suite of landforms and deposits representing much of the evidence for or effects of ancient ice advance and retreat.

Within the Grand River Valley are also found unusually 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.

Biological

From a biological standpoint many rare plants and other unique features are found in various parts of the Grand River Valley area. However, the truly outstanding biological feature is the extensive area of Carolinian forest in the central and lower part of the valley below Cambridge. This Carolinian forest or natural system occurs in Canada only in the most southerly part of Ontario, roughly below a line drawn from Windsor to Toronto. The Carolinian flora are species that occur infrequently or not at all elsewhere in Ontario or Canada, 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 reserve. 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 parallel and surround the Grand River, providing important habitat for the movement and survival of animal life.

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.

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. 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.

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 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. 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 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. Men such as William Hamilton Merritt were leaders in these enterprises.

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 on industrial history. Many others are described in the report on recreation. 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 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, probably extending to include the Six Nations Reserve, 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.

MISSION

CONSTRAINTS

Many constraints can limit or prevent the appropriate use and conservation of the natural and human heritage and recreational opportunities along the Grand River. These constraints are described in detail in the various reports that make up this study, notably that on Development Stresses. The most obvious or direct constraints have to do with recent rapid development in urban areas 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 problems are especially acute in Kitchener/Waterloo/Cambridge, Guelph and Brantford.

In more rural sections of the river, stresses from conflicts among recreational activities and other related uses can threaten the forests, wetlands, landforms, historic structures, land uses and ethnic patterns which are the basis for heritage and recreational opportunities in the first place. A major problem in rural areas is the impact of agriculture through clearing of vegetation and habitat for mechanized farming, artificial and till drainage, and from fertilizer run-off and other non-point sources of river 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. Local and regional governments, the 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; the land use and human or historical heritage policies of local governments; conservation areas; Environmentally Significant Areas (ESAs); regional parks; agreement forests; 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 using 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 management issues frequently put forward about these means or other mechanisms for more appropriate use and conservation is the question 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 brought together or co-ordinated for optimal 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. This applies to co-ordination for conservation as well as uses such as recreation and tourism. Underlying this interest in co-ordination is a concern for integrated planning and management in the Grand River Valley.

One of the concerns which has to be addressed in securing Canadian Heritage River status is the means available to maintain the integrity of the features, processes or resources upon which the CHR designation was based in the first instance. Effective co-ordination in the conservation and use of key features and processes is most important in maintaining this integrity. Compatible policies and procedures are needed throughout the river valley and ultimately the watershed.

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 made in this study.

Another potential way of bringing the various agencies, groups and people together to provide for the integrity of Grand River Valley heritage and recreation is the continued development of hiking trails. The report on Grand Valley Trails prepared as part of this 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.

New opportunities for trail development are opening up as railway lines are closed in various parts of the valley. Especially promising in this regard is the riverside line which is being closed between Cambridge and Paris. This route is of considerable historic interest in terms of early railroads. It also seems to be located in an area which might have fewer conflicts with local landowners over trail development and use than would be the case in other localities. Finally a trail along this rail line would pass through one of the most outstanding natural areas in the Grand River Valley. Members of the study team have referred to this area as the Dumfries landscape complex. This landscape contains many excellent examples of a wide range of glacial landforms and a long stretch of Carolinian forest bordering the Grand River. Other significant natural and historic features are found nearby.

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 zone around the river to which the CHR designation applies. Although the CHR Board suggests that this be done as part of the inventory, we have not done so in this study because of the complexity of the matter and the desire to get opinions and information on how the border would relate to heritage features and recreational opportunities from the agencies, groups and people in the basin. They will have to live and work with any boundary so it seems appropriate that it be decided upon as part of the Management Plan. The delimitation of the boundary may require some

innovations in the case of the Grand, for example it may be desirable to identify different types of management areas along the river as well as means of co-ordination among concerned agencies. The GRCA may have to play a key role through its floodplain and other regulations along the valley.

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 study stress the need for more information, so that planning and management can be improved through increased understanding. Examples of this call for further information include the biotic, human and recreation (and tourism) reports. 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. Many of the recreation and tourism statistics were completed some years ago and should be updated.

In summary then, the 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 recreational and tourism opportunities will be planned for along the length of the Grand River Valley. The foregoing comments apply especially to the geologic, biologic, historic and recreational resources that are truly outstanding and make the case for Canadian Heritage River Status for the Grand.

Heritage and Sustainable Development

Finally 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. Some of these natural and cultural features and processes are essential to acceptable change or development in future. An understanding of geology, vegetation,

MISSION

animal habitats, and other key natural phenomena as well as ethnic, industrial and other human history is important to the understanding of our present circumstances as well as where we are going in the years ahead.

In this fundamental sense, heritage is an essential part of overall comprehensive planning and management in the Grand River Valley and its watershed.

References

The basic references are the various research projects commissioned as part of the Grand River Heritage Study.

Two other sources cited in the text are:

Cathexis Associates. 1987. *Revised Heritage Rivers Evaluation Project*. Prepared for the Parks and Recreational Areas Branch, Ontario Ministry of Natural Resources.

MacLennan, Hugh. 1974. *Rivers of Canada*. (With the camera of John De Visser), MacMillan Co., Toronto.

***THE GRAND AS A CANADIAN
HERITAGE RIVER***

Background Reports

Submitted to
the Heritage Resources Centre Workshop

on

HERITAGE RIVERS IN CANADA:
THE CONCEPT AND ITS APPLICATION TO THE
GRAND RIVER

October 6 - 7, 1988

Geological Heritage of the Grand River Area

Mark A. Bowes



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CONTEXT

The Grand River landscape provides the base for agriculture, mining, and other economic activities, as well as scenery and other features. Geologic processes, such as mass wasting and flooding, influence the human land use of the valley and the watershed. The geologic environment also provides the foundation for biological habitats. In many cases, a diverse surface leads to many diverse plant and animal groupings.

The Grand River drainage basin is the largest in southern Ontario, covering an area of about 6,734 square kilometres. The 290 km long Grand River originates northeast of Dundalk at about 526 metres above sea level (asl) on some of the highest land in southern Ontario (Figure 1). The Grand River at Port Maitland empties into Lake Erie at 174 m asl.

Four main tributaries feed into the Grand. The Nith drains the western portion of the watershed and empties into the Grand at Paris. The Conestogo drains the west-central section of the basin and enters the Grand near the village of Conestogo. The Speed/Eramosa system drains the eastern side of the valley and empties into the Grand at Preston, Cambridge. Fairchild Creek drains the area northeast of Brantford, entering the Grand east of the city. Numerous other feeder creeks drain into the Grand as well.

For all intents and purposes, the Grand River and one of its tributaries, the Speed, are two of the oldest rivers in southern Ontario, for they formed some of the first meltwater channels draining retreating ancient glaciers in Ontario. The Grand varies in its stage of geologic development at various places along its course. At Elora, where it cuts through bedrock, the river displays the steep slopes and other characteristics of a vigorous, youthful stream. Farther downstream, where the river cuts through glacial deposits, it displays characteristics of an older, more mature river due to its wide, sweeping meanders. What makes this river interesting is that most of this meandering occurs in the central portion of the valley rather than near the mouth as is the norm for most rivers. In fact, as the Grand approaches its mouth the river is rather straight, with only large bends rather than meanders.

The Grand River can be considered a natural corridor of time, exposing and linking paleozoic bedrock, glacial and contemporary deposits associated with different periods in the geologic development of Ontario.

PATTERNS

Bedrock Geology

The entire study area is underlain by limestone and dolomite, with lesser amounts of shale and some sandstone. With the exception of the Devonian-age rocks in the extreme west of the basin, the rocks of the watershed are Silurian in age, over 415 million years old. The oldest rocks in the valley are dolomite of the Amabel Formation which lies east of Guelph. Good exposures of such rocks are to be found at Rockwood. A small outcrop of Oriskany sandstone is located near Nelles Corners in the southern portion of the basin.

Much of the Grand River north of the Belwood Reservoir flows on or close to bedrock. Bedrock also outcrops as spectacular 23m cliffs at Elora (Plates 5 and 6) and 25m cliffs at Preston, Cambridge (Figure 1). An extension of the buried Dundas valley extends into the Grand River valley at Brantford, and possibly Ayr. However, since the geography

of this feature is not completely known, it has not been mapped in this study. A buried valley also exists under the Grand River in the Glen Morris area.

Quaternary Geology

The entire study area was glaciated at least four times during the Pleistocene Epoch, the last and most important being the Wisconsin advance. Ice lobes entered this section of the province from two different directions. The Lake Huron/Georgian Bay ice lobe advanced from the northwest while the Lake Ontario/Erie ice lobe advanced from the southeast. These two ice lobes finally met near what is now Kitchener-Waterloo and Elmira to create the Waterloo Moraine (Sand Hills) and the Elmira Moraine (Figure 1). The two ice lobes began to retreat from this interlobate area some 16,000 years ago. They left various deposits in their wake such as poorly sorted clay, silt, sand and gravel deposits or till, as well as well-sorted outwash or kame sand and gravels (Figure 1). Such deposits are often associated with uneven rolling, hilly areas or moraines which mark stops or stages in ice retreat. Several spillways or old channels cut by meltwaters, including the Grand River itself, are also present. Low spoon-shaped hills or drumlins such as those in the Guelph area were often smoothed out of older glacial deposits during ice advance. Finer lake bottom sediments in the lower Grand River valley were left by formerly extensive lakes such as Whittlesey (13,200 years before present or yBP) and Warren (12,900 yBP).

A brief description of the major glacial landform features in the valley is presented in Table 1. Definitions of various terms are provided in the Glossary at the conclusion of this report.

The Grand River watershed also has a large number of variously sized aquifers. Aquifers provide natural underground water storage reservoirs in rock or unconsolidated materials. When tapped, these "sponges" yield groundwater. The Kitchener-Waterloo area has long depended on the Waterloo-Mannheim aquifer west of the cities as a water source for domestic and industrial uses. This is one of the largest aquifers in the watershed. Most aquifers are associated with the very thick glacial deposits, primarily the Waterloo Moraine, in the central portion of the basin between Ayr and Elmira. Another large aquifer exists northeast of Cambridge.

SIGNIFICANCE

In order to determine which areas or features are of geological significance for heritage use and conservation, a series of criteria were adopted from several previous works including: McKenzie, 1979; Ontario Ministry of Natural Resources, 1981; Grigoriev, Theberge, and Nelson, 1985; Smith and Theberge, 1986; Swinson and Greig, 1987; and Forbes *et al.*, 1987. Additional information was gained from *Canadian Heritage Rivers System: Objectives, Principles, and Procedures*, 1984. These criteria are:

- a) rare or unusual features, assemblages, or processes not normally found in the valley or in Ontario or Canada;
- b) features representative or typical of a particular landform type, or of a particular event in the geologic history of Ontario;
- c) landscape diversity;
- d) the relatively natural condition of a feature or features.

Areas of geologic significance are presented in Figure 2 and described in Table 2. It is rather difficult to determine the degree of rarity of features, provincially or nationally, because of a lack of information on similar features outside southern Ontario. Consequently, only a few nationally significant features have been identified in the valley. Such sites are the potholes at Rockwood, the Baden kame complex, and the Elora gorge.

Several sites constitute representative examples of larger landforms or particular stages in the geological development of southern Ontario. The Everton area, Elora quarry, Highway 7 roadcut, and Guelph Correctional Centre quarry all have representative examples of Guelph and Amabel Formation bedrock types. Chicopee ski hill and the Hawkesville site are representative of kames. The junction of the Paris, Galt, and Moffat Moraines also provides representative examples of the respective landforms, as well as a stillstand position of the retreating glacial ice lobe (Table 2).

In addition, a particular feature on its own may only be locally significant but, when considered in association with surrounding landforms, the entire area may be considered significant provincially or nationally. Such is the case with the Doon, Cambridge, Paris, Cedar Creek area to be referred to as the Dumfries landscape complex. Some landforms in this area are only locally significant in the valley, but the entire assemblage taken as a whole is considered to be at least provincially significant, including examples of kames, eskers, meltwater channels, kettles, limestone and dolomite cliffs, outwash plains, moraines and various different tills.

Many of the significant features or areas have been left relatively intact with respect to the geology of the site. However in some cases, for example Chicopee ski hill and the Baden kame complex, structures have been built on or near the features but have done little to date to detract from their heritage value.

A further important theme with respect to sites of significance is that of water storage. Within the valley several natural water storage areas or aquifers are capable of pumping over 900 litres of water per minute, including the Waterloo-Mannheim aquifer. Such aquifers have been an important source of water supply for development and are a significant part of the Grand River heritage.

CONSTRAINTS

Areas of geologic constraint to heritage use and conservation are those which exhibit, or have the potential to exhibit, processes which can destroy or alter landforms or present a hazard to people (Figure 3). Constraint areas were classified into three categories: conflict, tension, and compatibility. In order to determine the type or degree of constraint, a modified overlap system was used. In this method, the greater the number of constraints in a particular area, the greater the overall constraint score. However, if one constraint was or had the potential to be particularly severe, a high score was also given. Such is the case with the Waterloo aquifer, for reasons of high groundwater contamination susceptibility. Applying this technique results in several areas showing high constraints: Brantford, Paris, Ayr, Freeport, and Bridgeport. Tension and compatibility categories have successively lower constraints (Figure 3 and Table 3). The criteria used to derive areas of geologic constraint are:

- a) areas exhibiting sensitivity or susceptibility to erosion;
- b) areas prone to seasonal flooding;
- c) aquifers susceptible to groundwater contamination;

- d) areas which provide NATURAL barriers to river navigation such as waterfalls; and
- e) areas prone to groundwater seepage and subsequent erosion along riverbanks.

Aggregate mining and urban growth should be considered as two additional stresses or constraints on many geologic features, especially kames and eskers, such as in the Hidden Valley area of Kitchener. It is understood that such practices are necessary, but perhaps they could be managed in such a manner as to conserve significant geologic heritage features.

MANAGEMENT ISSUES

Several management issues should be considered with respect to heritage use and conservation of geologic resources:

1. Urban expansion and its impacts on geologic features.
2. The most appropriate management arrangements for conserving sites of geologic significance.
3. Aggregate and mineral extraction.
4. Water supply/aquifer contamination.
5. Rehabilitation of exhausted pits and quarries.
6. Public education and awareness concerning geologic features.
7. Determination of the Heritage River corridor boundary.
8. Management of significant features outside this boundary.

One possible management alternative could be to compile an "endangered landforms" list similar to the endangered species list. Geologic features which are rare or highly unusual could be identified and conserved for heritage use in this manner.

Planning
Classes

Glossary

- Aquifer* An earth or rock layer which will absorb water and allow it to pass freely through and, when tapped with a well, yield ground water. An example is the Waterloo-Mannheim aquifer.
- Drainage Basin* The total land surface which is drained by one river system.
- Drumlin* A relatively streamlined and elongated hill with steep sides, formed by a glacier. In profile, they often resemble the back of a whale in the water with one end being blunt and rounded, while the other is more tapered. There are over two hundred such features in the Guelph area.
- Escarpment* A steep slope or scarp, usually of rock, which divides areas of higher and lower elevation. They are normally the result of rock layer undercutting and/or differential weathering and erosion. An example is the Onondaga Escarpment.
- Esker* Normally a long, narrow, snake-like ridge of partially layered sand and gravel, left behind by a stream running under a glacier. A good example is found at West Montrose.
- Kame* A steep-sided ridge or roughly conical hill of layered sand and gravel left behind by glaciers and glacial meltwater. Good examples are Chicopee, Baden, and Pinnacle Hills.
- Kettle* A depression, often with a springfed lake in the bottom, with no significant inflowing or outflowing surface water channels. Examples are Wrigley, Bannister, and Puslinch Lakes.
- Moraine* A roughly linear accumulation of till, exhibiting a ridge-like appearance with several hills and depressions, left by a glacier. A good example is the hilly area south and east of Cambridge. Such **recessional** or **end** moraines mark the terminus or stillstand period of a glacier.
- Outcrop* A place where bedrock is exposed or nearly exposed at the surface of the land. Outcrops occur at Elora, Cambridge, and Rockwood.

Outwash Plain

A wide, nearly flat to gently rolling area, primarily composed of layered sand and gravel left by the meltwater from a glacier. The great width is due to several old drainage channels emerging from the melting glacier. Examples include parts of the Dumfries landscape complex and the Waterloo-Guelph Airport area.

Physical Landscape

A combination of the rocks and landforms that make up the non-living landscape.

Spillway Channel

A large, broad, and often deep valley that served to carry water away from a melting glacier. For example, the Grand River occupies the bottom of a spillway channel.

Till Plain

A usually relatively flat to gently rolling area of clay, silt, sand, pebbles, and boulders mixed together in various proportions, left behind by a glacier. Often referred to as **Ground Moraine**.

Topography

The general lay of the land: hills, flats, valleys, cliffs, and so on.









GRAND RIVER HERITAGE STUDY

FIGURE 1

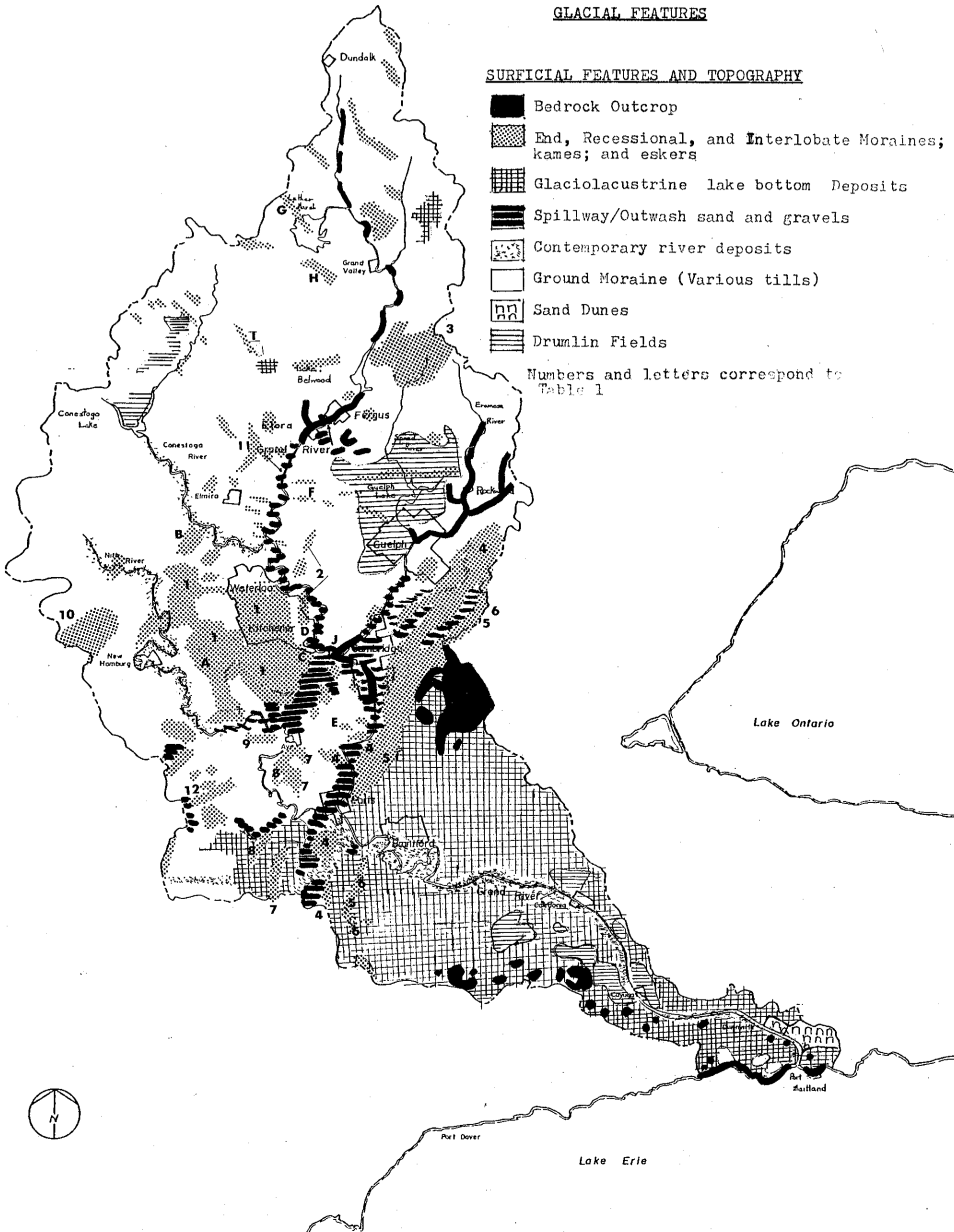
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GLACIAL FEATURES

SURFICIAL FEATURES AND TOPOGRAPHY

-  Bedrock Outcrop
-  End, Recessional, and Interlobate Moraines; kames; and eskers
-  Glaciolacustrine lake bottom Deposits
-  Spillway/Outwash sand and gravels
-  Contemporary river deposits
-  Ground Moraine (Various tills)
-  Sand Dunes
-  Drumlin Fields

Numbers and letters correspond to Table 1



GRAND RIVER HERITAGE STUDY

FIGURE 2

0 1 2 3 4 MILES
Date prepared - 1988.

AREAS OF SIGNIFICANCE

- National Significance
- Provincial Significance
- Local/Regional Significance
- 16 Reference Number For Table 2

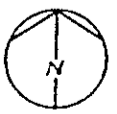
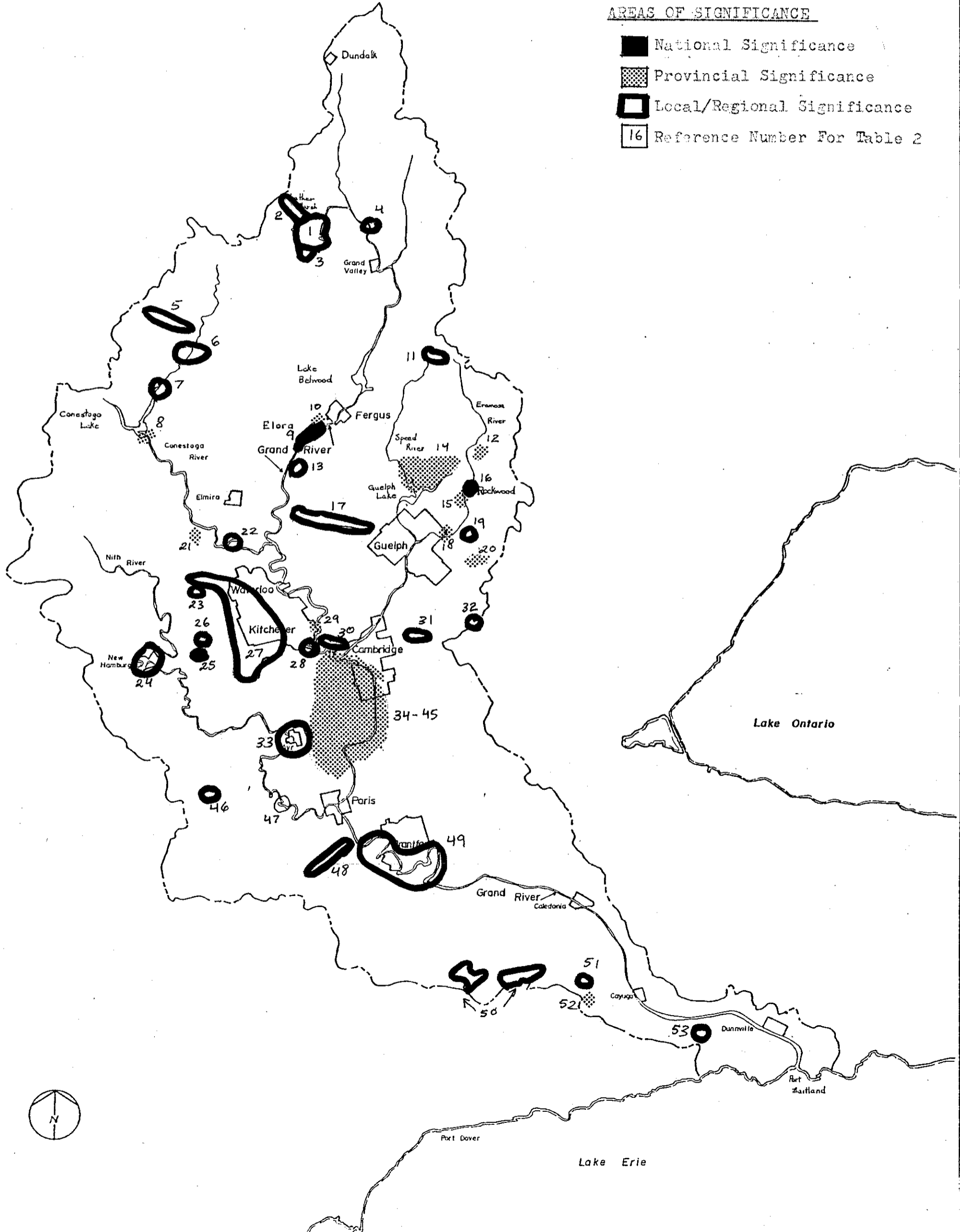


FIGURE 3

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES
Date prepared - 1988.

CONSTRAINTS

- HIGH (Conflict)
- ◌ MEDIUM (Tension)
- ⊙ LOW (Compatibility)
- SEASONAL FLOODING
- ▲ EROSION
- ▨ AQUIFERS CAPABLE OF PUMPING >900 L/min.
- ≡ SEEPAGE OF GROUND WATER

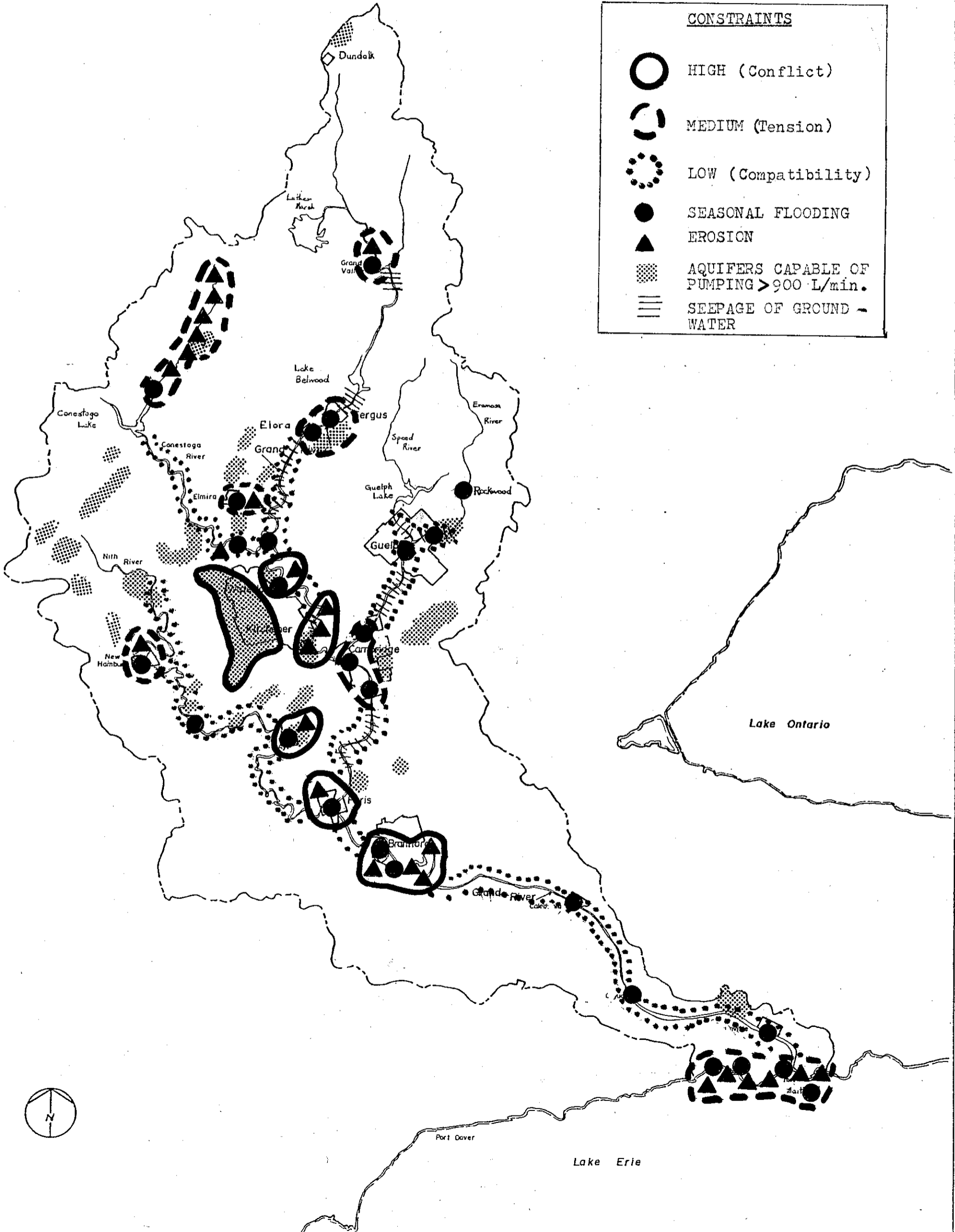


TABLE 1

Glacial and Glaciofluvial Features

(Numbers and letters correspond to Figure 1)

FEATURE	LOCATION	DESCRIPTION
A. MORAINES		
1. Waterloo	Kitchener-Waterloo Area	Probably the oldest moraine in southern Ontario. Mixture of fine sands and gravels and capped with till with associated kames and kettles.
2. Breslau	Breslau-Doon Area, toward Maryhill	Includes Pinnacle Hill, Chicopee Hill, Idlewood Park, Lackner Woods, and Natchez Hills in Kitchener.
3. Orangeville	Orangeville Area	Five to eight km wide, flat-topped, and composed of stratified material, mainly sand. It is believed to be related to the Elmira and Waterloo Moraines.
4. Paris	Cuts directly across the entire valley in the central portion	A high, hummocky, bouldery ridge to the north. South of Paris, it becomes less recognizable. Kettles and kettle lakes are common along its length.
5. Galt	Forms a continuous ridge across the entire valley	It closely parallels the Paris Moraine. It is a rough, stony, hummocky ridge north of Brantford becoming smoother and sandier to the south. Few kettles and kettle lakes are present. This moraine is separated from the Paris Moraine by a glacial meltwater channel.
6. Moffat	South of Galt Moraine	Forms a series of four ridges composed of Wentworth Till.
7. Tillsonburg	Central southwest portion of the valley	Sand and gravel with till.
8. Norwich	Central southwest portion of the valley	Sand and gravel with till.

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| 9. | Ingersoll | Central southwest portion | Sand and gravel core with till capping. It is believed of the valley to be an extension of the Orangeville, Elmira, Waterloo moraine system. |
| 10. | East Hope | West of New Hamburg | Considered to be an outlier of the Waterloo Moraine. This hummocky area is composed of sand and gravel capped with till. It is most rugged at Amulree. |
| 11. | Elmira | Centred in the Elmira area | Consists of a southern and northern section. The southern part is a low curved till ridge with a sand core. The northern part is a hummocky till-capped mass of kame gravel (Karrow, 1987:20). |
| 12. | St. Thomas | Central southwest portion of the valley | Sand and gravel with till |

B. KAMES

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| A. | Baden Hills | Between Baden and Petersburg | Form the most prominent group in southern Ontario. Consist of four almost symmetrically conical knolls in a group, one measuring 55 m high. |
| B. | Hawkesville | West of St. Jacobs | Composed of tills from two different ice lobes and is believed to be associated with the Elmira and Waterloo Moraines. |
| C. | Doon Pinnacle | South of Kitchener at Doon Hill (Plate 1) | A large hummocky hill complex measuring 46 m in height. |
| D. | Chicopee Ski Hill | Southeast section of Kitchener | A large, roughly conical hill 52 m high. |
| E. | Dumfries Kame Complex | North Dumfries Township west of the Grand River | A series of variously sized kames associated with deglaciation. Includes Alps Woods, Sudden Tract, and Hungry Hills. |

C. ESKERS

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|----|---------------------------------|----------------------------------|--|
| F. | Guelph, Ariss, & Eramosa System | Between West Montrose and Guelph | Long, narrow ridges composed of gravel. The Guelph Esker appears in Plate 2. |
| G. | Egerton | Luther Marsh area | Thin esker actually runs through this marsh from northwest to southeast. |
| H. | Mountview | South of Luther Marsh | Associated with kame gravels and sands. |

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| I. Riverbank | Northwest of Arthur | |
| J. Freeport | Kitchener to Cambridge | The Grand River cuts through this esker between Hidden Valley and Freeport. It trends northwest to southeast. |
| D. KETTLES | North Dumfries Township | The largest concentration occurs in association with the Paris Moraine. Examples include: Blue Lakes, Spottiswoods Lakes, Puslinch Lake, Pinehurst Lake, Wrigley Lake, and Bannister Lake. |
| E. DRUMLINS | Guelph area | The Guelph drumlin field is composed of some 300 such features, 1 to 1.6 km long, 350 m wide, and about 13 m high. Several are superimposed. |
| | Drayton-Rothsay area | |
| | Tuscarora Township | |
| | Caledonia/Cayuga area | |
| F. OUTWASH/
SPILLWAYS | The upper and middle section of the Grand River | In the Glen Morris/Spottiswoods Lakes area, a large spillway has cut through the Paris/Galt Moraine system, creating a wide gap (Plate 3). The Grand River spillway is particularly wide at Cambridge. |
| | Cedar Creek | This was, at one time, the route of the Grand River when ice blocked flow to the south through Cambridge. Meltwater came down this valley to Ayr and through a gap into the Thames River system. |
| G. GLACIO -
LACUSTRINE
DEPOSITS | Southeast of Paris/
Galt Moraine to Lake
Erie | A side expanse of sand, silt, and clay, or shallow and deep post-glacial lake bottom deposits. Of the five post-glacial lakes in this area, two are particularly important: Lake Whittlesey (900 foot/274 m contour) and Lake Warren (870 foot/265 m contour). Beaches occur at St. George, Clanbrassil, Nelles Corners, and a sand dune delta at Dunnville. |

TABLE 2

Sites of Geological Significance

(Numbers shown here correspond to those on Figure 2)

	SITE	LEVEL OF SIGNIFICANCE	DESCRIPTION
16	Rockwood	Canadian	Site of the largest pothole in the world: "Devil's Well" (Plate 4). This site also has the largest concentration of potholes in Ontario, numbering some 300. Also present are several cliffs and gorges.
9	Elora Gorge	Canadian	This area possesses a rock gorge, caves, and a rock pillar in the middle of the Grand River known as the "Tooth of Time".
25	Baden Hills	Canadian	Four kames in a cluster.
	A Dumfries Landscape Complex	Provincial	
34	Cedar Creek		Former channel of the Grand River
35	Pinnacle Hill		Kame
36	Altrieve Lake and Woods		Kame and several kettles
37	Cruickston Park Farm		25 m limestone/dolomite cliffs
38	Salisbury Ridge & Victoria Park		Kame and kettles
39	Grand River at Galt		The river flows on bedrock
40	Alp's Woods (Dryden Tract)		Kame and kettle complex with esker
41	Hungry Hills		Kame and kettle complex
42	Bannister and Wrigley		Kettle lakes
43	Sudden Tract		Kame and kettle complex

44	Spottiswoods Lakes &		Kames, kettles, and probably the highest cut bank Pinehurst Lake area in the valley.
45	Glen Morris Valley		This is the area where the Grand River cut through the Paris/Galt Moraine some 14,000 years before present.
8	Conestogo Dam Cut		Provincial Features a nearly complete stratigraphic sequence of local tills. This is also the Type Section for the Mornington and Stirton Tills.
9	Elora Quarry	Provincial	A representative section of the Guelph Formation.
12	Everton Area	Provincial	A 16 m cliff showing the contact between the Eramosa member and the rest of the Amabel Formation.
14	Guelph Drumlin Field	Provincial	This area is representative of the larger drumlin field north of Guelph.
15	Highway 7 Roadcut	Provincial	This cut displays a 3.1 to 3.6 m thick sequence of the Eramosa member of the Amabel Formation.
16	Guelph Correctional Centre Quarry	Provincial	This cut shows a 9.2 m section of the Guelph Formation and the Eramosa member of the Amabel Formation.
21	Hawkesville Kame	Provincial	Marks part of the line where the two major ice lobes in southern Ontario met.
20	Junction of Paris, Galt, and Moffat Moraines	Provincial	Representative of all three moraines.
29	Chicopee Ski Hill	Provincial	An excellent example of a kame.
52	Oriskany Sandstone	Provincial	Only outcrop of this Devonian-age sandstone.
<hr/>			
1	Luther Marsh	Regional (valley)	An important source area for the Grand River.
2	Egerton Esker	Regional (valley)	Representative of the Tavistock Ice advance.
3	Mountview Esker	Regional (valley)	Representative of the Tavistock Ice advance.

4	Tabert Drift	Regional (valley)	Oldest major till in the Orangeville map area: the Catfish Creek Till.
5	Rothsay Drumlin Field	Regional (valley)	The drumlins indicate the direction of ice advance.
6	Drayton Area	Regional (valley)	Drumlins and an outwash plain are present.
7	Conestogo Till	Regional (valley)	Locally significant till in the Drayton area.
11	Orton area	Regional (valley)	Glaciolacustrine sediment & a portion of the Orangeville Moraine with a bisecting meltwater channel are present.
13	Inverhaugh Area	Regional (valley)	A good example of a braided river channel.
17	Guelph Esker	Regional (valley)	Represents the confluence of three eskers: Guelph, Eramosa, and Ariss, at West Montrose.
19	Arkell Meltwater	Regional (valley)	This channel cuts through the Paris Moraine to form a fan on an outwash plain.
22	St. Jacob's Till	Regional (valley)	A locally significant till in the St. Jacobs area.
23	Sunfish Lake	Regional (valley)	This meromictic lake with little or no oxygen at the bottom preserves pollen. These pollen grains can assist in determining past climates and vegetation types.
24	Nith River at New Hamburg	Regional (valley)	This is an area of intense river meandering.
26	Spongy Lake Bog	Regional (valley)	A Canadian Shield style bog where peat is forming.
27	Waterloo Aquifer	Regional (valley)	An important source of water for Kitchener-Waterloo.
28	Homer Watson Park	Regional (valley)	This area provides the Type Section for Maryhill Till, possesses several springs, and has a high steep-cut bank.
30	Freeport Esker	Regional (valley)	This esker connects the Breslau and Paris/Galt Moraines, and is cut through by the Grand River.
31	Puslinch Tract	Regional (valley)	This area is representative of the Paris Moraine.
32	Galt Moraine	Regional (valley)	This area is representative of the Galt Moraine.

- | | | | |
|----|--------------------------|-------------------|---|
| 33 | Nith River at Ayr | Regional (valley) | This area provides a good example of river meandering, oxbows, and goosenecks. |
| 46 | Ingersoll Moraine | Regional (valley) | This area is representative of this feature. |
| 47 | Canning Till | Regional (valley) | This area is the Type Section for Canning Till. |
| 48 | Whiteman's Creek | Regional (valley) | One of only a few kames in Brant County is found on the south side of this creek. |
| 49 | Grand River at Brantford | Regional (valley) | This area provides good examples of river meandering oxbows, and severe mass wasting processes. |
| 50 | Onondaga Escarpment | Regional (valley) | There are several rock outcrops along its length and it forms the southern boundary of the Grand River valley in this area. |
| 51 | Clanbrassil | Regional (valley) | This area has a raised bench of Lake Whittlesey or Arkona. |
| 53 | Upper Quarry | Regional (valley) | Devonian-age bedrock exposure. |

TABLE 3

Areas of Constraint

<u>CONFLICT:</u>	Highest number of overlapping constraints or severe individual constraints.
<i>Brantford-Cainsville:</i>	seasonal flooding, erosion, seepage of groundwater
<i>Paris:</i>	seasonal flooding, erosion, groundwater aquifer contamination susceptibility.
<i>Ayr:</i>	seasonal flooding, erosion, groundwater aquifer contamination susceptibility.
<i>Waterloo Aquifer:</i>	groundwater aquifer contamination susceptibility.
<i>Freeport:</i>	seasonal flooding, erosion, groundwater, seepage, groundwater aquifer contamination susceptibility.
<i>Bridgeport:</i>	seasonal flooding, erosion, groundwater, seepage, groundwater aquifer contamination susceptibility.
 <u>TENSION:</u>	 Intermediate number of overlapping constraints or moderately severe individual constraints.
<i>Cambridge:</i>	seasonal flooding
<i>Lake Erie Shoreline:</i>	erosion and seasonal flooding
<i>New Hamburg:</i>	seasonal flooding and erosion
<i>Elora-Fergus:</i>	seasonal flooding, groundwater aquifer contamination susceptibility, and falls
<i>Grand Valley:</i>	seasonal flooding, erosion
<i>Conestoga River North of Conestoga Dam:</i>	erosion

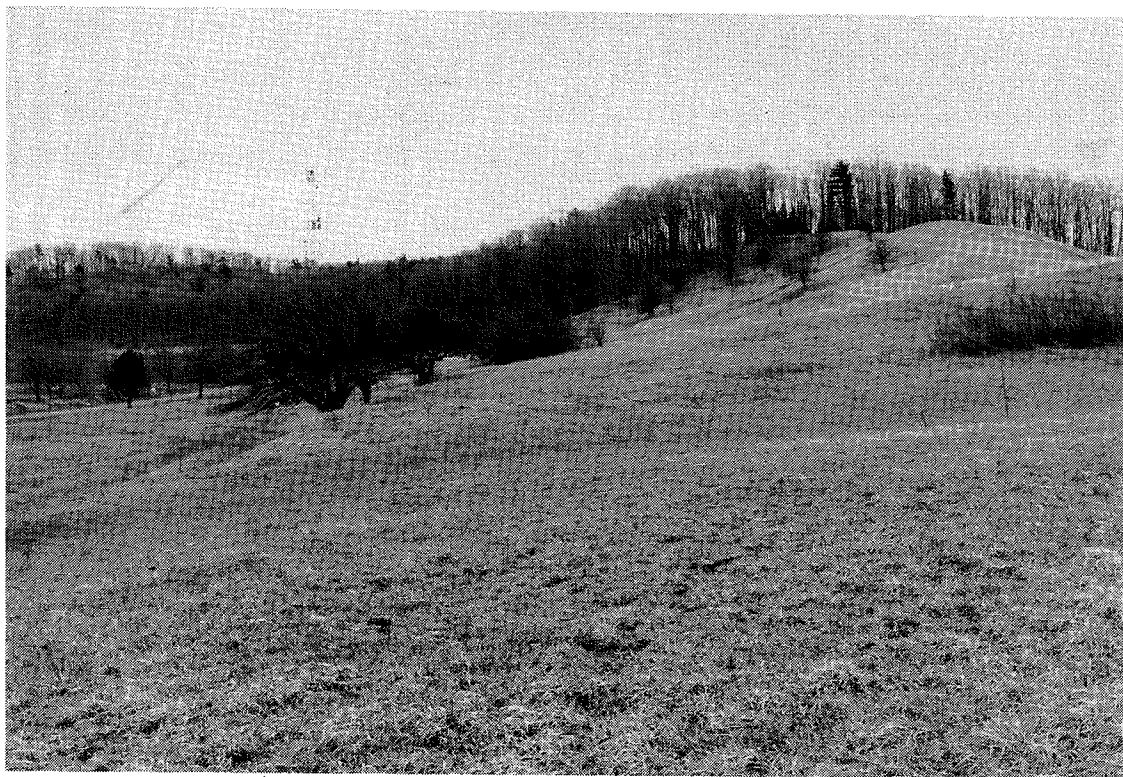


Plate 1: Typical Kame topography. Pinnacle Hill near Doon.



Plate 2: A portion of the Guelph Esker near West Montrose.

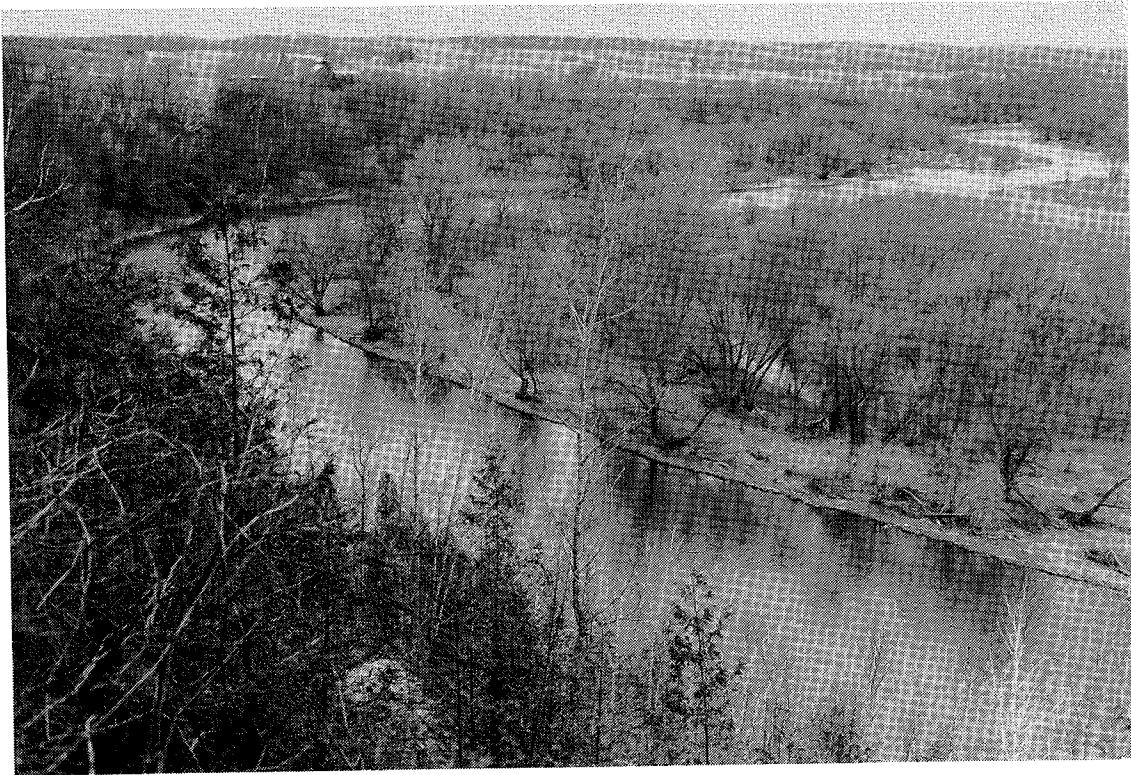


Plate 3: The Grand River has cut through the Paris/Galt Moraine near Glen Morris, forming a steep-sided river valley.



Plate 4: The "Devil's Well" in Rockwood is the largest pothole in the world, measuring some 6.4m wide and 15m deep.



Plate 5: The "Tooth of Time" is a resistant stack in the middle of the Grand River at Elora.

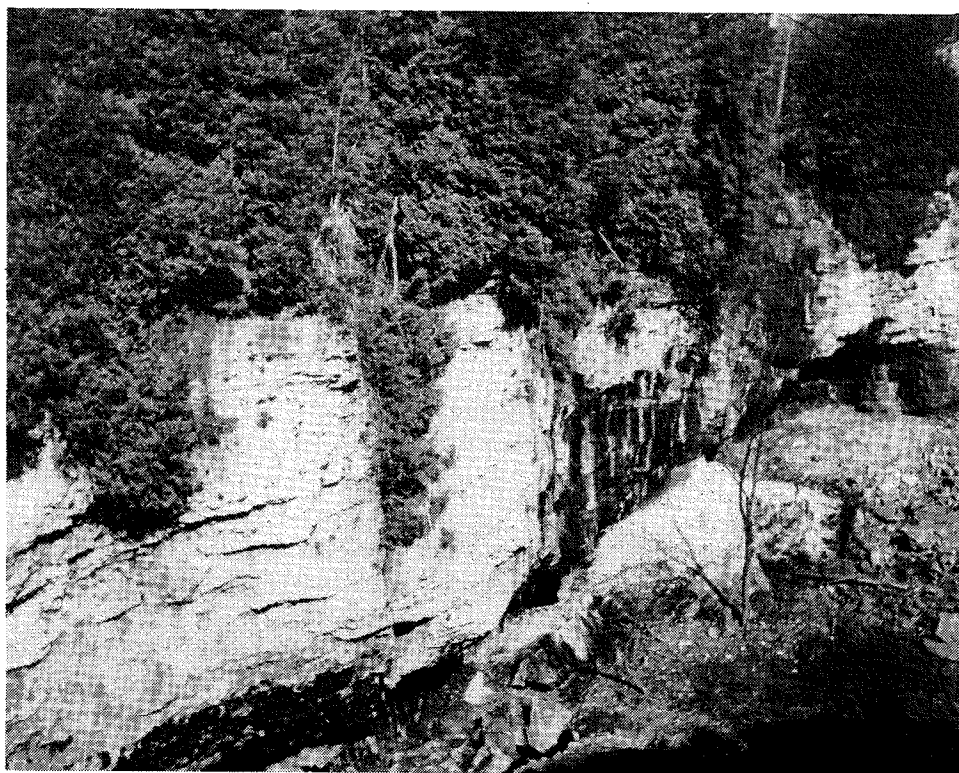


Plate 6: A portion of the limestone/dolomite gorge at Elora.

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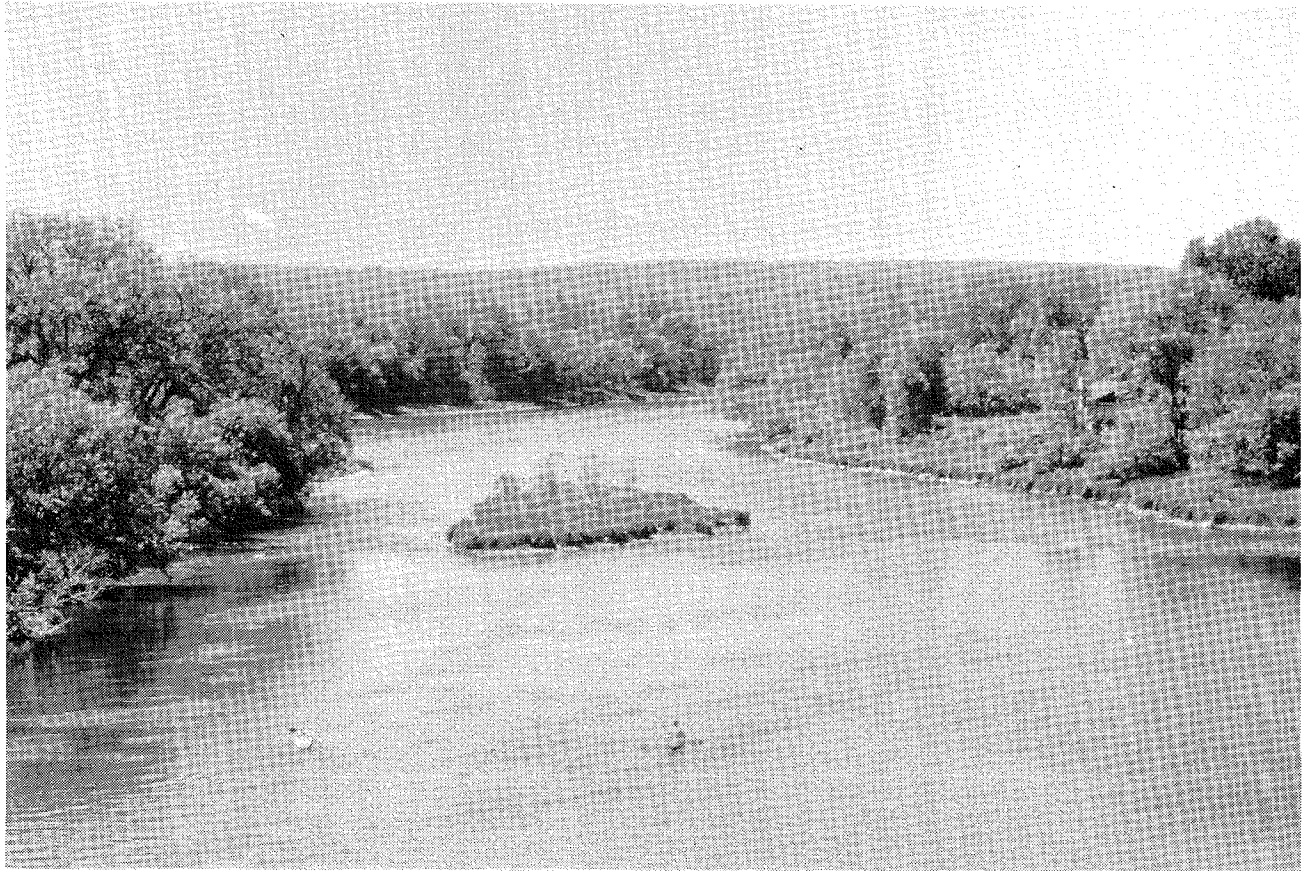
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Biological Features of the Grand River Area

David A. Balser



CONTEXT

Biotic features include the plant and animal species and the habitats and ecosystems of the watershed. The emphasis is on those which are natural or semi-natural, as opposed to the highly managed agroecosystems, although the interaction between the two cannot be ignored. The most significant areas are identified, along with related issues for natural heritage planning and management. Some management alternatives are also suggested.

In a cultural or human-dominated landscape such as southern Ontario, biotic features have been confined, for the most part, to remnant patches of habitat. It is this patchiness which creates the familiar mosaic effect in agricultural regions. Patches of more or less natural habitat reflect the presettlement landscape, and are therefore important heritage features. They also play a variety of other roles such as ameliorating the effects of agriculture and urbanization, and as resources for recreation and tourism. Thus, natural areas in a cultural landscape must be understood in a different context from those in a natural landscape. The biotic features of a cultural landscape are not depauperate relics of the pristine past; they are integral components of a landscape created by man over the years to serve his own needs. Unfortunately, the human propensity to dominate nature has led to a state of affairs where natural areas and the species they contain are not always as highly valued as they deserve to be.

The natural areas remaining within the watershed are a result of a history of human exploitation over many centuries, and particularly the last 150 to 200 years, rather than as a result of careful stewardship. In some instances, wooded areas were not cleared because they were unsuitable for agriculture. In other places, such as areas of Mennonite settlement, woodlots were left as a source of wood, maple products, and grazing for animals.

The advent of public policies for natural heritage conservation, by contrast, is a recent phenomenon. Only one small provincial park is located within the watershed (Rock Point) and only one park reserve (Cranberry Bog). Municipal planning authorities have in some instances designated certain areas as Environmentally Sensitive Areas (ESAs) since the 1970s. The GRCA has acquired lands according to its mandate since the 1940s. The Province has originated its ANSI program (Areas of Natural or Scientific Interest) and the Wetland Evaluation program within the last decade. However, there has been no coordinated assessment of the adequacy of these programs within the Grand River Valley or watershed.

When we think in terms of protecting species and ecosystems, we usually think in terms of ecological significance. A natural area has to be "special" to be an ESA or an ANSI; it generally has to have rare species, unusual plant communities or a large wooded area of value to wildlife, or other essentially structural features. However, another way to look at natural area protection is in terms of processes. Natural areas are not isolated entities in a landscape. They interact with surrounding land uses to reduce soil and water erosion. Wildlife move between areas, often via corridors, thus forming a network of habitats. Similarly, many natural areas are used for hunting, recreation, or nature study simply because of their proximity to urban areas, rather than because of any inherent biological significance. Thus it is important to consider systems of natural areas in context, and not focus simply on rare species and unique habitats.

PATTERNS

Bird Diversity

Data from the Ontario Breeding Bird Atlas database (see Cadman *et al.*, 1987) reveal a pattern of diversity which is closely linked with landscape (Figure 1). The generally even terrain of the glacial till plains in the northern third of the watershed have been extensively cleared for agriculture, reducing the amount and variety of habitat available for birds. Consequently, diversity is lowest in this area, ranging from 71 to 97 species of breeding birds per 10km² grid square. The varied topography of the Waterloo Sand Hills and the Galt moraine, by contrast, supports a rich assemblage of habitats, resulting in a remarkably high diversity ranging from 98 to 120 breeding species. The 10km² square in the Dumfries area has many rare species with both southern and northern affinities, including goshawk, acadian flycatcher, louisiana waterthrush, saw-whet owl, and red-bellied woodpecker. The gently undulating southern third of the watershed is of intermediate diversity, in the range of 85 to 107 breeding species.

The most outstanding habitat for birds is clearly Luther Marsh, with 134 species of breeding birds, making it one of the most diverse areas in the Ontario. Furthermore, a great many rarities are found here, including great egret, merlin, osprey, red-necked grebe, canvasback, lesser scaup, Wilson's phalarope, and least bittern.

Fish

A number of desirable fish species are found in the watershed. Figure 2 shows the distribution of cold and warm water streams, plus locations of important sport fish populations. Resident salmonid populations (brook and brown trout) are restricted to cold water streams. Migratory salmonids (coho and chinook salmon) can travel as far upstream as Paris by using fishways in the weirs at Dunnville and Caledonia, but these do not allow passage of walleye (pickerel). The large number of control structures on the Grand and its tributaries appear to limit spawning opportunities for certain sport fish. Overall, species diversity increases in the lower reaches of the Grand (Gartner Lee Ltd., 1987).

Several rare, threatened, and endangered species are also present:

The redbreasted dace is threatened and has been found in the Irvine River and in the Grand near Fergus. The [endangered] black redhorse has been found in the Grand downstream of Elora and in several locations in the downstream reaches of the Nith River. The [threatened] river redhorse is reported from one location in the upstream section of Fairchild Creek. The silver shiner is the most widespread of the rare fish species in the Grand. This shiner has been found in the Grand River from below Elora downstream to Brantford (Gartner Lee Ltd., 1987: 57).

Plants

The watershed spans two forest associations: the Great Lakes-St. Lawrence and the Carolinian or Deciduous forest zone (Rowe, 1972). Because of this, and the variety of ecosystem types in the watershed, the flora is relatively rich, with approximately 1400 species of vascular plants in the Region of Waterloo alone. The following is a list of 42 rare vascular plant species found in the Grand River watershed since 1950 (Argus *et al.*, 1982-1987).

ANNONACEAE	
Asimina triloba	Pawpaw
APIACEAE	
Conioselinum chinense	Hemlock parsley
Sanicula canadensis	Long-styled Canadian sanicle
ARACEAE	
Arisaema dracontium	Green dragon
ARALACEAE	
Panax quinquefolia	Ginseng
ASPLENIACEAE	
Phegopteris hexagonoptera	Broad beech fern
Polystichum braunii	Braun's holly fern, Eastern holly fern
ASTERACEAE	
Solidago arguta	Sharp-leaved goldenrod
BORAGINACEAE	
Lithospermum latifolium	American gromwell, Broad-leaved pucco Virginia cowslip, Bluebells Shaggy false gromwell, Hairy marble seed
Mertensia virginica	
Onosmodium molle var. hispidissimum	
CAPRIFOLIACEAE	
Viburnum recognitum	Southern arrow-wood
CELASTRACEAE	
Euonymus atropurpureus	Burning bush
CUSCUTACEAE	
Cuscuta campestris	Field dodder
CYPERACEAE	
Carex gracilescens	Slender sedge
FABACEAE	
Glycyrrhiza lepidota	Wild licorice
Strphostyles helvola	Wild bean
FAGACEAE	
Castanea dentata	Chestnut, American chestnut
Quercus ellipsoidalis	Northern pin oak, Hill's oak
GENTIANACEAE	
Frasera caroliniensis	American columbo
JUGLANDACEAE	
Carya glabra	Pignut hickory
LAMIACEAE	
Lycopus rubellus	Taper-leaved bugleweed, Stalked water horehound
Monarda didyma	Oswego tea, bee-balm
LILIACEAE	
Disporum lanuginosum	Yellow mandarin
Hypoxis hirsuta	Yellow stargrass
LINACEAE	
Linum virginianum	Virginia yellow flax
NYMPHAEACEAE	
Nuphar advena	Yellow pond-lily, Yellow water-lily

NYSSACEAE	
<i>Nyssa sylvatica</i>	Black gum, Black tupelo
ONAGRACEAE	
<i>Ludwigia polycarpa</i>	Many-fruited false loosestrife
<i>Oenothera pilosella</i>	Meadow sundrops
OPHIOGLOSSACEAE	
<i>Botrychium rugulosum</i>	Rugulose grapefern, Ternate grapefern
POACEAE	
<i>Stipa spartea</i>	Porcupine grass, Needle grass
POLYGONACEAE	
<i>Polygonum arifolium</i>	Halberd-leaved tear-thumb
POTAMOGETONACEAE	
<i>Potamogeton hillii</i>	Hill's pondweed
RANUNCULACEAE	
<i>Thalictrum revolutum</i>	Wax-leaved meadow-rue
ROSACEAE	
<i>Crataegus dodgei</i>	Hawthorn
RUBIACEAE	
<i>Galium pilosum</i>	Hairy bedstraw
SCROPHULARIACEAE	
<i>Agalinis gattingeri</i>	Gattinger's agalinis
SCROPHULARIACEAE	
<i>Aureolaria pedicularia</i>	Woodland fern-leaf, False-foxglove
VALERIANACEAE	
<i>Valeriana sitchensis</i>	Marsh valerian, Northern valerian
VIOLACEAE	
<i>Viola palmata</i>	Early blue violet
<i>Viola pedata</i>	Bird's foot violet, Pansy violet

The historical ecology of the watershed has been most thoroughly documented for three townships in the Regional Municipality of Waterloo (Janusas, 1987). An analysis of data from the original surveyors' notes for the area revealed several major tree associations. For North Dumfries Township, they were hard maple, elm, beech, and basswood, plus white oak, red oak, white pine, and thickets. For Wilmot Township, hard maple, ironwood, beech, elm, and basswood were dominant, while in Wellesley Township hard maple and elm formed one dominant group, and hard maple and basswood the other (Janusas, 1987). These are not radically different from what is found in remnant natural areas today, with the obvious exception of the elimination of elm as a forest dominant.

Of course, the landscape had already been altered by man prior to European settlement. The role of Indian agriculture in maintaining favourable conditions for white pine was also addressed by Janusas. White pine is in some instances correlated with areas which may have been used by the Woodland Indians for slash and burn agriculture, primarily on light textured soils. However, it appears that clearings were frequently created by windthrow, and this was enough to prevent the pines and other shade intolerant species from being eliminated by the climax forest. Therefore, it is difficult to assess the exact influence of Indian agriculture on vegetation patterns.

Since the time of European settlement the major change in the floristic composition of the watershed has not been in the number of species even though many species have been introduced and some have been lost. There has been a serious loss of forest interior habitat

and a concomitant increase in the amount of edge habitat. The response of fauna to this change has been a decline in the number of species which are sensitive to habitat fragmentation, such as bobcat and red-shouldered hawk, in favour of edge and field adapted species such as raccoon and blue jay.

SIGNIFICANCE

Criteria for Natural Areas

There is no universally accepted set of criteria by which to determine the significance of a natural area (Margules and Usher, 1981). Criteria used to determine significance vary considerably among conservation programs. The ANSI program uses five criteria (e.g. see Lindsay, 1984).

1. Representation
2. Diversity
3. Condition
4. Ecological considerations
5. Special features

ANSIs are primarily intended to form a set of representative ecosystems based on the land classification system of Angus Hills (1961). Site regions are divided into site districts, which are broken into physiographic regions based on Chapman and Putnam (1973). Natural areas have been sought out to represent each major physiographic feature, e.g. upland forest on the Norfolk Sand Plain.

Quite a different approach is taken in county ESA surveys. The ESA methodology (Eagles and Adindu, 1978) uses nine criteria, which are summarized below:

1. Unusual landform
2. Ecological function
3. Unusual or high quality communities
4. Unusual or remnant habitat
5. Diversity
6. Rarity
7. Size
8. Scientific or educational value
9. Aesthetic value.

Unlike the ANSI program, ESAs emphasize areas which have some unique quality, reflecting the popular affinity for rarity and diversity which are the most common criteria used in nature reserve designation (Smith and Theberge, 1986).

The third system to be considered is the Ministry of Natural Resources' wetland evaluation program. This program is unique in that it attempts to rate all remaining wetlands in southern Ontario according to a points system. Each wetland receives a score based on a number of factors in each of four categories: biological, social, hydrological, and special features. Each wetland is then placed in a class ranging from 1 to 7 based on the scores. Classes 1 and 2 are considered provincially significant, while class 3 is considered regionally significant (Glooschenko *et al.*, 1988).

Finally, World Wildlife Fund's Carolinian Canada project drew up a list of 36 "critical unprotected areas" in the Carolinian zone (Eagles and Beechey, 1986), through

which the lower half of the Grand River flows. These areas were selected by consensus amongst a committee of experts. Six Carolinian Canada sites are located in the basin.

Significance is a thorny issue, especially national significance as applied to natural areas. Certain areas are obviously of national significance, such as national parks and national wildlife refuges, but the absence of such a designation does not imply that the area cannot be nationally significant. The determination of nationally significant areas in the Grand River watershed is a continuing and difficult process.

Lower levels of significance are much easier to establish. ANSIs and wetlands are designated as having either provincial or regional significance where warranted. ESAs can be assumed to be locally significant when not also designated an ANSI or significant wetland.

There are, of course, problems with these guidelines. It would be naive to assume that only those areas designated as being provincially significant, and no others, are provincially significant. There is too much incongruity between programs and far too little ecological inventory to assume that all the most important sites are known. However, it is reasonable to assume that all areas labelled "provincially significant" are at least that, and some of these may be of national significance as well.

Figures 3, 4, and 5 show the distribution of provincially and regionally significant natural areas in the Grand River watershed, as drawn from the latest available information from the OMNR's ANSI and Wetland Evaluation programs, plus Carolinian Canada sites. Also shown on Figure 5 are the locations of "nodes of diversity" in the landscape, where there are significant areas or clusters of areas.

In order to estimate national significance for the study, three criteria are proposed:

1. the area is a Carolinian Canada site;
2. the area is both a provincially significant ANSI and a provincially significant wetland;
3. the area possesses an outstanding degree of rarity and diversity.

The rationale for these criteria is quite simple. Firstly, the entire Canadian portion of the Carolinian life zone is confined to a small area of southern Ontario. Therefore, the most important Carolinian sites are the only examples to be found in Canada. Secondly, for OMNR to designate an area "provincially significant" in both its comprehensive evaluation schemes suggests that such an area is of the highest rank. Thirdly, "outstanding", though a qualitative term, is what the Canadian Heritage Rivers Board uses to characterize the features which may contribute to a Heritage River designation, and would imply that a certain degree of subjectivity is acceptable, as long as the case for outstandingness can be well made.

According to the above criteria, the list of areas in the watershed which may be of national significance (with criteria in parentheses) would include:

1. *Luther Marsh* (2,3)

Luther Marsh was created in 1952 when a dam was constructed across Black Creek flooding an area of approximately 4000 ha. It has since developed into "the largest, most valuable inland marsh in southern Ontario" (OMNR and GRCA, n.d.). It also contains upland hardwood forest, cedar swamp, conifer plantations, boreal forest, and a 501 ha bog (Ecologistics, 1982).

2. *Eramosa River Valley/Blue Springs Creek wetland complex (2)*

This is a swamp extending over 1045 ha. The habitat is diverse and includes many regionally significant plant species. It is also home to a number of unusual mammals, including the Canada Lynx, Bobcat, and River Otter (Glooschenko *et al.*, 1988).

3. *Beverly Swamp (1,2)*

Beverly Swamp is an wetland covering 1876 ha. It provides habitat for many rare species of birds, mammals, and herpetofauna, as well as 48 regionally rare plant species (Glooschenko *et al.*, 1988).

4. *Grand River Forest (1,3)*

Running 18 km from Paris to Galt, these forests contain "swamp, willow-black maple flood plains, a variety of slope and upland forest types (i.e. oak-hickory), perched fens, prairie, and gravelly calcareous spring-fed lagoons" (Hanna, 1984). An impressive number of rare plant species have recently been found (L. Lamb, pers. comm.).

5. *Spottiswood/Pinehurst Lakes and Woodlands (1,2,3)*

A highly diverse site composed of intermittent ponds between sand hills. The hills are vegetated with oak-hickory forest, while depressions contain swamp and bog fringe (Hanna, 1984).

6. *Sudden Bog (1,3)*

This is a 69 ha site which includes Carolinian forest, sphagnum bog, a remnant prairie, and many unusual plant species (Eagles and Beechey, 1985).

7. *Cranberry Bog (2,3)*

A 45 ha bog in a kettle depression, surrounded by a fringe of upland forest. Several provincially rare plant species are found here (Hanna, 1984).

8. *Central Whiteman's - Horner Creek wetland complex (2,3)*

These wetlands having a total area of 2328 ha are source areas for Whiteman's Creek, a provincially significant trout stream. Habitat is provided for 8 provincially significant species and 1 endangered species (W. MacMillan, pers. comm.).

9. *Six Nations Réserve (1)*

This 9200 ha block of Carolinian forest is the largest in Canada. It is home to many southern forest-interior species of songbirds, and a number of significant plant species (Eagles and Beechey, 1985).

10. *Oriskany Sandstone and Woodlands (1)*

This is an unusual area of about 335 ha, with sandstone outcroppings of the Oriskany formation. Many Carolinian species are present, as well as oak savannah and prairie elements (Macdonald, 1980).

11. North Cayuga Slough Forest (2)

This is a large site comprised of forest on low ridges alternating with diverse wetlands and slough ponds. Over 460 vascular plant species have been identified (Macdonald, 1980).

12. Dunnville Grand River Marshes (2)

This is a 5 km section of the lower Grand dominated by emergent marsh vegetation, but also including "one of the very few relatively undisturbed river shoreline forests in the region (Macdonald, 1980).

13. Dumfries Townships landscape complex (1,2,3)

This group of areas includes the Grand River forests, Spottiswood Lake, Sudden Bog, Cranberry Bog, Oliver's Bog, Branchton Prairie, Fairlake, Bannister-Wrigley lakes, Dickson Wilderness Area, Big Turnbull Lake, Little Turnbull Lake, Blue Lake, and wetlands in the Glen Morris area, many of which are Carolinian Canada sites, plus provincially and regionally significant ANSIs and wetlands. A great variety of habitats found here, including upland and lowland forest, bog, and prairie.

CONSTRAINTS

Public Support

The continued existence of the diverse flora and fauna of the Grand River watershed depends on a number of factors. The most important is the value which the public places on nature conservation. This is especially true for significant areas on private land. No government agency is obliged to do anything to protect these areas; therefore, in an era of scarce resources for conservation, public concern may make the difference between action and no action.

Even with broad public support, however, the feelings of the landowners themselves can hardly be ignored. The regulatory powers of public agencies are limited compared to the well-established rights of property owners (Swaijen, 1979). Regulation, however, is a double-edged sword; it may be effective, but it may also create resentment among the landowners subject to it. A balance of persuasive and regulatory means of protection, combined with the acquisition of rights for the most significant properties, would seem to be the most efficacious procedure.

Legal Constraints

There are also problems associated with any new conservation measures from a legal and political perspective. Consider the Dumfries landscape complex. A number of models exist elsewhere for the protection of landscapes which include both natural and anthropogenic land uses. Examples include Areas of Outstanding Natural Beauty in Great Britain and cluster biosphere reserves such as the Trebon Biosphere Reserve in Czechoslovakia (Jenik and Kvet, 1984). Either of these possible approaches have the advantage of dealing with a diverse landscape in a holistic and integrated manner. The disadvantage is that provincial legislation may be required to adopt this type of approach. It is difficult to extrapolate from the brief history of the Long Point Biosphere Reserve, where the patterns of land use and land tenure are quite different.

Ecological Ignorance

Another constraint is the lack of detailed knowledge of the ecology of cultural landscapes in the Grand River Valley area. Many natural areas have never been inventoried or only cursorily. The distribution and abundance of many species are also poorly understood. Add to this the uncertainty surrounding the long term survival of isolated populations, or the dynamics of species dispersal, and one is forced to conclude that there is a great deal about even a "civilized" landscape like the Grand River watershed about which we are ignorant. This raises important questions about the adequacy of protecting a few "outstanding" natural areas in a landscape subject to urban and agricultural pressures. Public policy cannot focus solely on the protection of significant areas, because such areas will never be numerous enough to safeguard the integrity of the landscape as a whole. "Integrity" implies a condition where species diversity is relatively high, and ecological processes such as ground water recharge or normal predator-prey relationships are still intact. Both diversity and ecological processes will suffer if only a few natural areas are preserved as "living museums" while the rest of the landscape is converted to "productive" uses.

ISSUES

Nodes and Corridors

An important planning concept which must be addressed arises from the cultural landscape context. Natural areas which are greater in size and importance than others can be thought of as "nodes". The twelve areas listed above as possibly having national significance would qualify. In the literature of landscape ecology, there is much discussion of the importance of connecting nodes with corridors of natural vegetation to allow for the movement of wildlife (Noss, 1987).

Of the twelve nodes, only two (the Oriskany Sandstone site and the Beverly Swamp) are not either adjacent or close to the Grand River or one of its tributaries. Obviously, a set of naturally vegetated corridors to link up the nodes seems unlikely, given interruptions caused by urban and agricultural land use. However, a corridor need not traverse only natural areas to have value, as the many hiking trails in the valley demonstrate. Furthermore, a series of designated corridors along river valleys could be administratively feasible given the ability of municipalities and the GRCA to regulate land use on the flood plain.

Landscape Complexes

In a cultural landscape, individual natural areas may be of minor significance in themselves, but may be highly significant when a diversity of habitats occur as a cluster. North and South Dumfries townships contain a cluster of natural areas remarkable for its diversity, which includes upland and lowland Carolinian forests, bogs, and prairie elements. This diversity is largely a function of topography; the Galt and Paris moraines are too steep or rocky for agriculture in many places, and the numerous kettle depressions have resulted in the formation of bogs. Some of the individual natural areas are already recognized as being highly significant, but overall or true significance cannot be recognized unless the area is treated as a "landscape complex". Included within the complex are farms, villages, and other economic uses of the land. The means of designating such an area in land use planning terms, however, appear to be rather limited.

Protection versus Designation

A question relevant to the CHRB's integrity guidelines is the degree to which designated natural areas are also protected. All of the significant natural areas shown on Figures 3 to 5 have been designated as ANSIs, wetlands in class 1 to 3, or Carolinian Canada sites, but relatively few of them are sufficiently well protected that their future is no longer in doubt. Many areas are on private land, and protection of these areas is sometimes a difficult issue.

For provincially significant ANSIs on private land, the province has agreed to explore a range of protection options from designation under various Acts, formal or informal agreements with landowners, to conservation easements or acquisition (Parks and Recreational Areas Branch, 1987). The provincial policy on protection of significant wetlands has yet to be announced (Glooschenko *et al.*, 1988).

Other possible mechanisms include ESA designation in official plans, application of flood and fill line regulations by the CA, and private stewardship agreements through the Natural Heritage League. A new category of protected area could be created, such as "Natural Heritage Area", with or without provincial legislation.

Institutional Capacity for Management

The responsibility to protect species and ecosystems is currently divided among the province, municipalities, and conservation authorities. All of these governmental institutions have different programs designed to fulfill different mandates. Therefore, a coordinated program to protect natural heritage would first depend on establishing the scope, goals, and objectives of heritage protection. The second requirement would be effective inter-agency cooperation. The likelihood of achieving this aim seems slim given the extremely limited budgets and manpower currently devoted to natural heritage conservation, especially at the municipal government level where it can be nonexistent.

A related issue concerns the possibility of implementing new or innovative heritage protection measures, such as the node and corridor concept. Who would take the lead, and then see the plan through to implementation? Does any agency, even at the provincial level, have the mandate to do this? Most conservation-oriented agencies have trouble carrying out existing mandates, let alone assuming new responsibilities. The GRCA is an obvious candidate for assuming the lead role in terms of heritage planning and protection in the watershed, but it remains to be seen whether the agency itself is willing to develop the expertise to do this, and whether its member municipalities are willing to cooperate.

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES

Date prepared - 1988.

BIOTIC FEATURES: FIGURE 1

BIRD SPECIES DIVERSITY

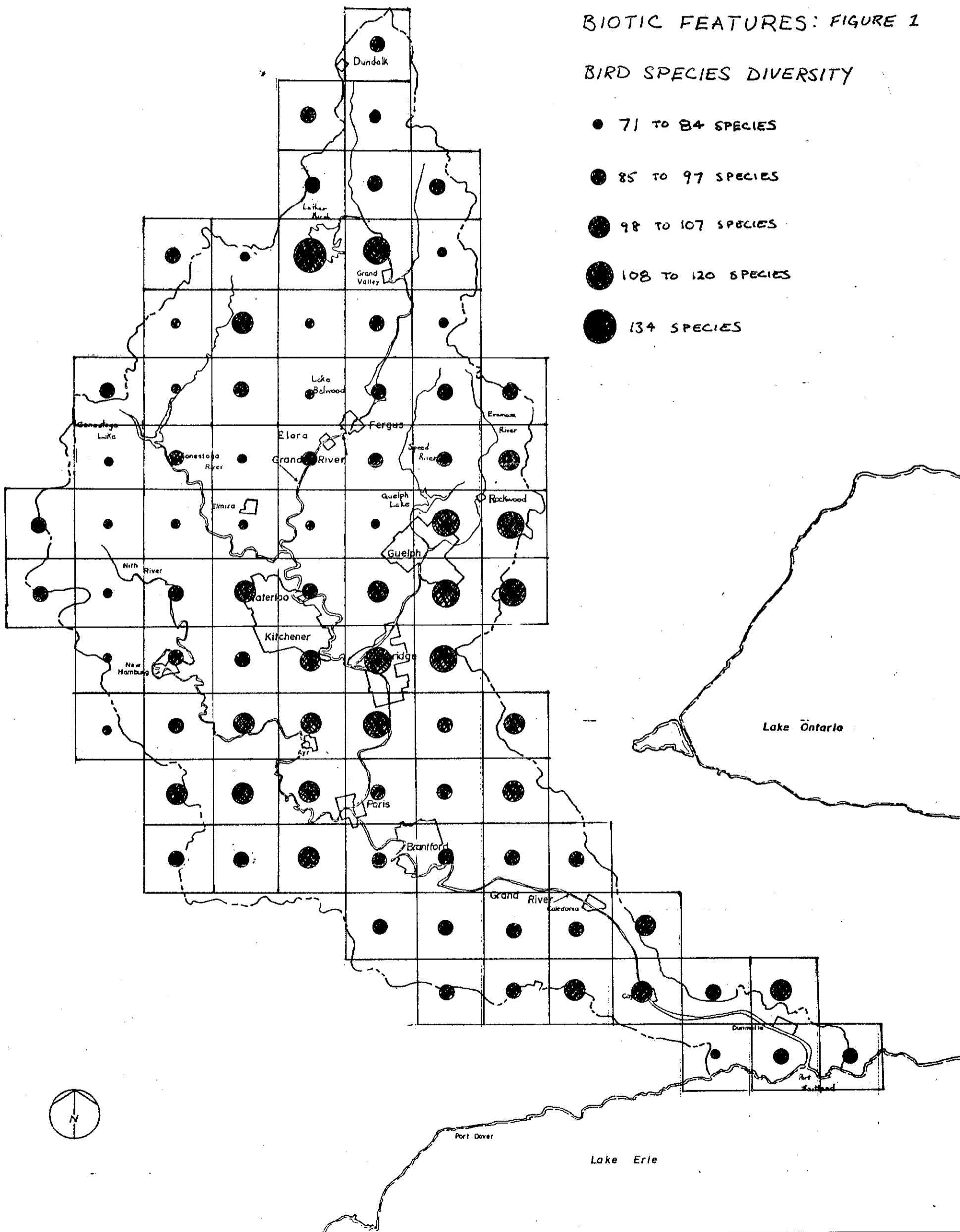
● 71 TO 84 SPECIES

● 85 TO 97 SPECIES

● 98 TO 107 SPECIES

● 108 TO 120 SPECIES

● 134 SPECIES

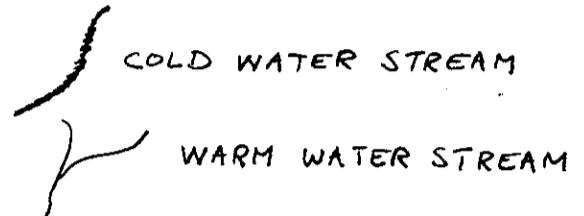


GRAND RIVER HERITAGE STUDY

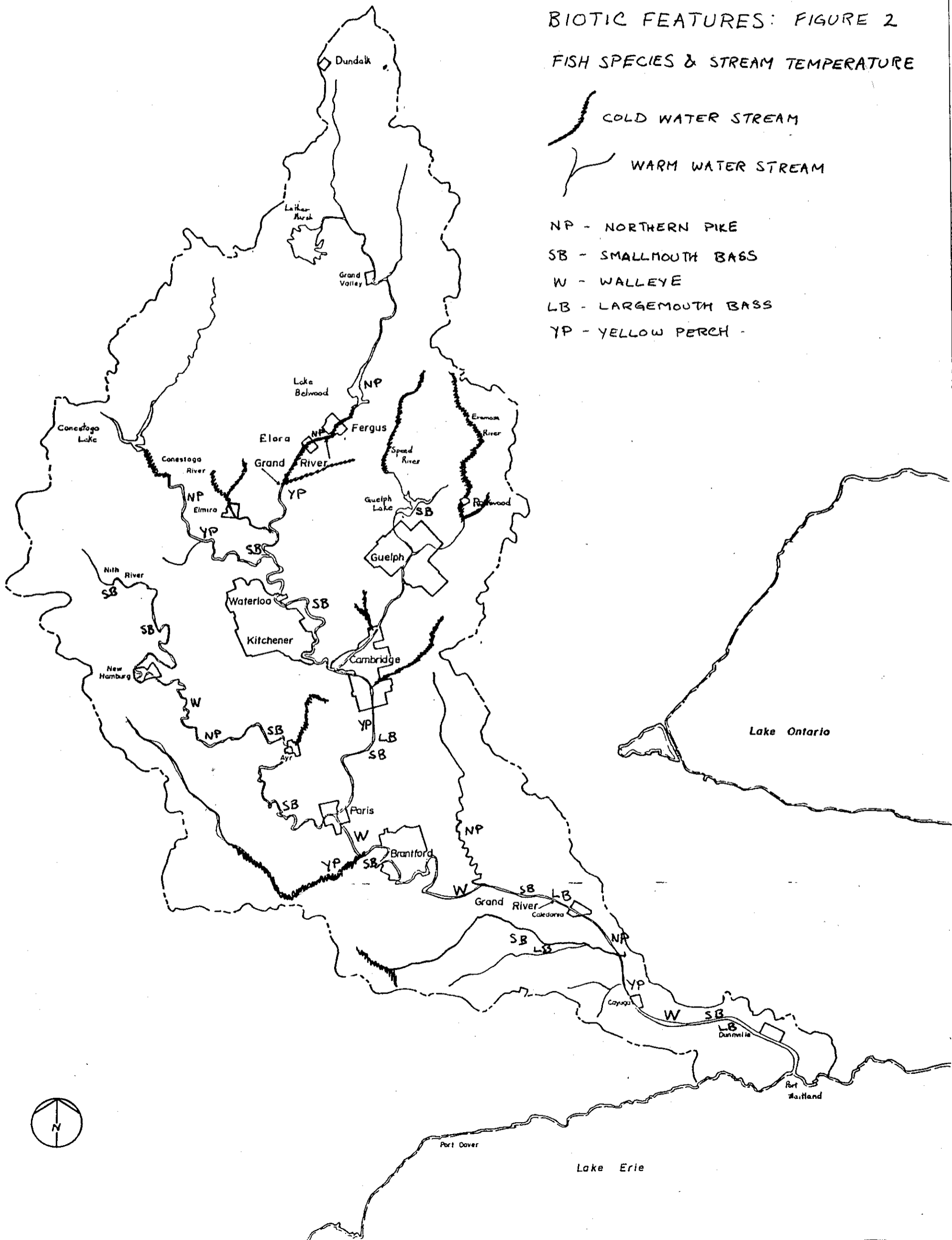
0 1 2 3 4 MILES 5

Date prepared - 1988.

BIOTIC FEATURES: FIGURE 2
FISH SPECIES & STREAM TEMPERATURE



- NP - NORTHERN PIKE
- SB - SMALLMOUTH BASS
- W - WALLEYE
- LB - LARGEMOUTH BASS
- YP - YELLOW PERCH

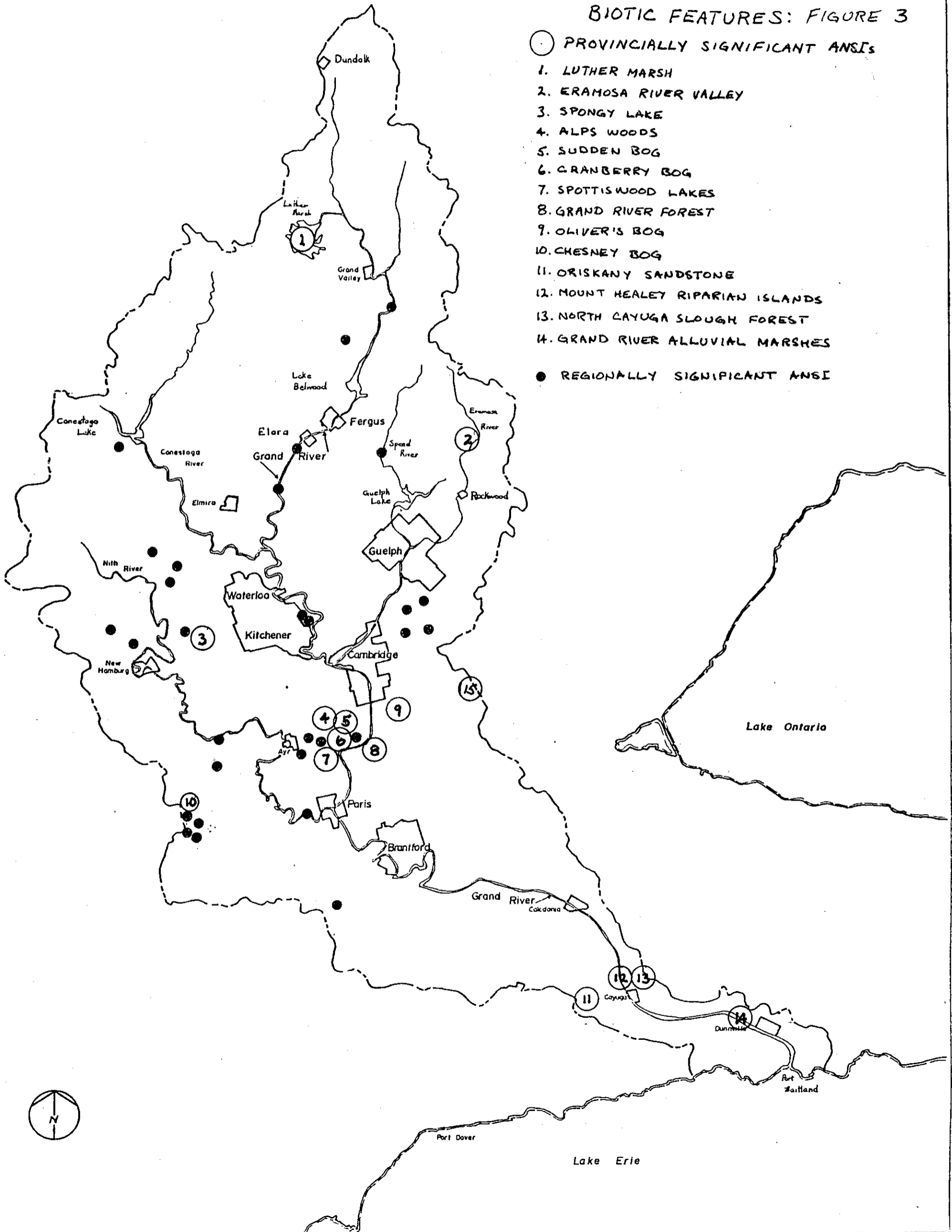


GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5 12
 Date prepared - 1988.

BIOTIC FEATURES: FIGURE 3

- PROVINCIAALLY SIGNIFICANT ANSIS
- 1. LUTHER MARSH
- 2. ERAMOSIA RIVER VALLEY
- 3. SPONGY LAKE
- 4. ALPS WOODS
- 5. SUDDEN BOG
- 6. CRANBERRY BOG
- 7. SPOTTISWOOD LAKES
- 8. GRAND RIVER FOREST
- 9. OLIVER'S BOG
- 10. CHESNEY BOG
- 11. ORISKANY SANDSTONE
- 12. MOUNT HEALEY RIPARIAN ISLANDS
- 13. NORTH CAYUGA SLOUGH FOREST
- 14. GRAND RIVER ALLUVIAL MARSHES
- REGIONALLY SIGNIFICANT ANSIS

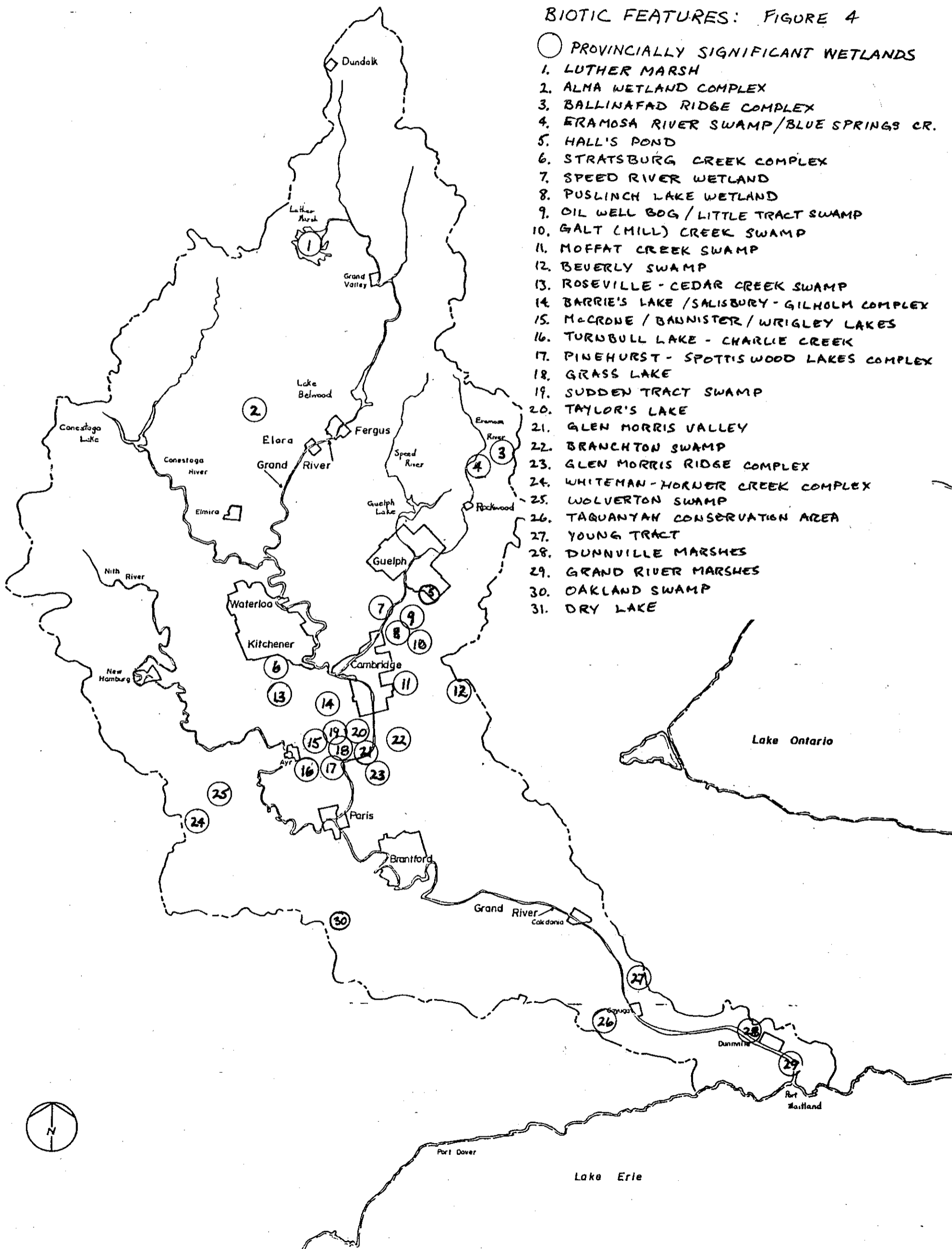


GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5 6 7 8 9 10 11 12
 Date prepared - 1988.

BIOTIC FEATURES: FIGURE 4


- PROVINCIALY SIGNIFICANT WETLANDS
- 1. LUTHER MARSH
- 2. ALMA WETLAND COMPLEX
- 3. BALLINAFAD RIDGE COMPLEX
- 4. ERAMOSA RIVER SWAMP/BLUE SPRINGS CR.
- 5. HALL'S POND
- 6. STRATSBURG CREEK COMPLEX
- 7. SPEED RIVER WETLAND
- 8. PUSLINCH LAKE WETLAND
- 9. OIL WELL BOG/LITTLE TRACT SWAMP
- 10. GALT (MILL) CREEK SWAMP
- 11. MOFFAT CREEK SWAMP
- 12. BEVERLY SWAMP
- 13. ROSEVILLE - CEDAR CREEK SWAMP
- 14. BARRIE'S LAKE / SALISBURY - GILHOLM COMPLEX
- 15. MCCRONE / BANNISTER / WRIGLEY LAKES
- 16. TURNBULL LAKE - CHARLIE CREEK
- 17. PINEHURST - SPOTTISWOOD LAKES COMPLEX
- 18. GRASS LAKE
- 19. SUDDEN TRACT SWAMP
- 20. TAYLOR'S LAKE
- 21. GLEN MORRIS VALLEY
- 22. BRANCHTON SWAMP
- 23. GLEN MORRIS RIDGE COMPLEX
- 24. WHITEMAN - HORNER CREEK COMPLEX
- 25. WOLVERTON SWAMP
- 26. TAGUANYAN CONSERVATION AREA
- 27. YOUNG TRACT
- 28. DUNNVILLE MARSHES
- 29. GRAND RIVER MARSHES
- 30. OAKLAND SWAMP
- 31. DRY LAKE

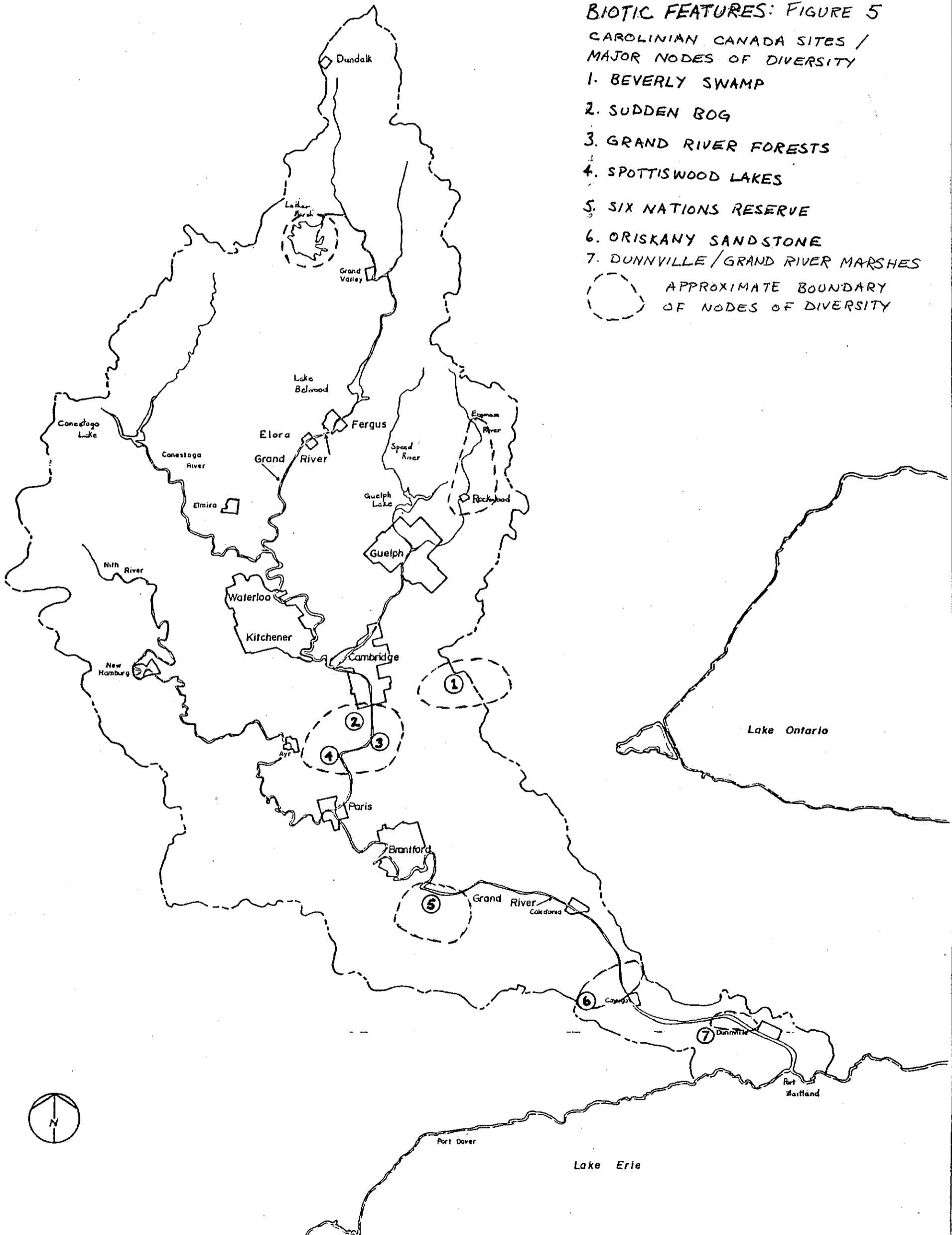


GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5 6 7 8
 Date prepared - 1988.

- BIOTIC FEATURES: FIGURE 5**
 CAROLINIAN CANADA SITES /
 MAJOR NODES OF DIVERSITY
1. BEVERLY SWAMP
 2. SUDDEN BOG
 3. GRAND RIVER FORESTS
 4. SPOTTISWOOD LAKES
 5. SIX NATIONS RESERVE
 6. ORISKANY SANDSTONE
 7. DUNNVILLE / GRAND RIVER MARSHES

 APPROXIMATE BOUNDARY
 OF NODES OF DIVERSITY



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Water Quality and Grand River Heritage

George R. Smith



CONTEXT

Water Quality can be defined in many different ways by using different measures, criteria and standards. For rivers and lakes around the Sudbury basin for example, the pH value of water is an important criterion in evaluating changes due to acid rain. The degree of turbidity or water clarity is important in areas where erosion and siltation problems occur. The edibility of fish is rated annually in Ontario rivers (Ontario Ministry of Environment, Ontario Ministry of Natural Resources, 1987). This evaluation is based on analysis of fish sample flesh for chemical, mineral and organic contaminants. Other water quality methods include analysis of water samples on a regular basis for chemical, mineral and organic levels as well as analysis of river bottoms for evidence of microscopic organisms which occur under certain conditions. The presence or absence of these micro-organisms indicates the presence or absence of various water quality or pollution conditions or problems.

The use of the word problem raises the point that perceptions and attitudes of the citizen, scientist and manager are important in defining water quality. In the case of the Grand River for example, persons interested in the use and conservation of old mills, flood control structures or other human heritage features can be expected generally to be less concerned about low turbidity or high water clarity than canoeists. In other words it is difficult if not impossible to identify and use water quality indicators in such a way as to provide an absolute standard or standards for all uses or users.

Water quality has been an important factor in the attainment of Canadian Heritage River status, as can be seen in the case of the French River, Ontario. This river is located in a relatively less populated and developed area with little associated agriculture or industry along its banks. The *French River Heritage Waterway Pilot Study* states that a recent survey by the Ontario Ministry of Environment determined that overall water quality of the river was good when compared to provincial standards. French River water reportedly is soft with "an alkalinity resistant to regional effects of acid rain". It has "favorable pH values for aquatic productivity - water clarity is generally good throughout" (Ontario Ministry of Natural Resources, 1979). The main criteria used in heritage assessment in the French River case are pH values and clarity.

The French and other current Canadian Heritage Rivers form the general background against which we must consider the case for the Grand. In thinking along these lines, two things are quite important. First, the river has been subjected to a two hundred year settlement history which clearly has left a natural and human heritage that is often very significant, aside from the quality of the water in the river itself. Second, considerable overall improvement in water quality has occurred along the Grand with the vigorous pollution control efforts of the last twenty-five years or so.

PATTERNS

Figure 1 shows water quality in the Grand River in terms of a Grand River Conservation Authority Water Quality Index (Stegelmeier, 1986). This index is based on measures of suspended solids, temperature, turbidity, pH and dissolved oxygen. Data on these measures were taken along the Grand at various times during the year between 1967 and 1984. A system was used to combine these measures into a rating scale ranging from 0 to 100. This system is shown on Table 1.

Data for twelve stations with relatively lengthy records and which are distributed relatively evenly along the Grand are plotted on Figure 1. Interestingly enough the data

TABLE 1

Significance of the Water Quality Sub-Rating Values

Water Quality Sub-Rating	Water Quality Evaluation
100	Excellent
>85	Very Good (for given use)
>75	Good (for given use)
60-75	Satisfactory (quality not good, but water still considered usable)
<60	Bad (water not usable as is; requires treatment to improve its quality)
0	Very Bad (water usable only on short-term basis with normal treatment; long-term treatment would be complex and costly)

Source: L. Stegelmeier. 1986. *Grand River Water Quality Index*. Grand River Conservation Authority.

show that water quality is generally very good throughout the river valley, with the exception of the Cambridge area which rates as good. Examination of the data also corroborates the point made previously about recent improvement in Grand River water quality.

Data on quality or edibility of sport fish have also been collected (Ontario Ministry of Environment, 1987). The only restrictions on eating fish caught at any time of the year on the Grand River apply around relatively highly populated industrial areas such as Waterloo, Kitchener and Cambridge. The only prohibitions on consumption apply to Lake Erie walleye 26 inches or more in length caught in the Dunnville/Port Maitland area.

SIGNIFICANCE

Overall then, water quality in the Grand River is good to very good, although not outstanding in the sense of some of the remote rivers in the Canadian Heritage Rivers System. In other words the water quality of the Grand is in itself not considered to be a basis for Canadian Heritage River designation. However, the water quality seems to be fine for Carolinian vegetation, wildlife and other significant natural features and also for old mills, industrial history and other important human features. The water quality is less favourable for certain types of recreation in certain periods of the year, but is generally good for a wide range of recreation and tourism activities overall, as noted in the section of this Grand River Heritage Study on recreation.

CONSTRAINTS

Some constraints on water quality still exist along the Grand River. Modern sewage plants decrease pollution but tend to increase water temperature and do not completely eliminate all pollution. Agriculture causes erosion in various parts of the basin and leads to some siltation in the river. Agricultural fertilizers run-off and affect water quality through what are called non-point sources of pollution. Areas of primary concern in terms of water quality are noted on Figure 1.

MANAGEMENT ISSUES

Two major issues in terms of Grand River water quality are appropriate regulation of current and future development stresses along the river generally, and management of point and non-point sources of pollution specifically. Management in future could involve 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. This is happening to some degree along the river at present. Economic and non-point sources of pollution pose a wide-ranging challenge for the future. Increased attention will be needed to run-off and erosion caused by agriculture as well as other development along the river edge.

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Human Heritage of the Grand River

Mark Epp



"This river flowing between its shrubby-clad banks, and meandering through a fertile and open tract of country, has a most pleasing aspect. The prospect displays a minuteness and unobtrusiveness, which are strikingly opposed to that vastness and bold magnificence which characterize most of the scenery of North America."

John Howison, Sketches of Upper Canada, 1821

"I never realized that there was history, too, close at hand, beside my own home. I did not realize that the old grave that stood among the brambles at the foot of our farm was HISTORY."

Stephen Leacock

"Nonetheless, the region had certain distinctive features and an exciting diversity....And despite the assimilation which went forward in certain districts the various groups - Indian, European and American - which settled in the valley managed to preserve at least some of their dominant characteristics and presented to the outsider not a thoroughly integrated picture but an engaging mosaic of contrasting tones and colours."

Charles M. Johnston, 1962

PURPOSE

The overall objective of the Grand River Heritage Study is to complete an inventory and analysis of the natural and human heritage features, as well as the recreational opportunities, that exist within the Grand River valley. This information will be useful in deciding upon the possible designation of the Grand River as a Canadian Heritage River. Even if this goal is not realized, the study results will be beneficial in the local management of heritage resources.

In researching the human or cultural heritage, research was carried out on two levels. First, a summary outline of the region's prehistory and history was necessary to establish significant and characteristic themes. Such research enabled a better interpretation of existing human heritage resources. Secondly, an inventory of human heritage resources was undertaken to which appropriate historical themes could be related. In addition, constraints on human heritage resources were identified as well as management issues relating to human heritage resources.

Thus, the chief purpose is to form a concrete idea of the variety and significance of human heritage resources in the watershed in order to meet the human heritage value guidelines for the Canadian Heritage Rivers System.

CONTEXT

Human Heritage Themes

Three human heritage themes have been recognized as significant and characteristic: 1) native heritage; 2) the valley's "cultural mosaic" or diversity; and 3) industrial heritage. A fourth theme, the history of flood control and conservation, could also be developed as important in the twentieth century. However, the general focus in this section of the Grand River Heritage Study has been on themes and events up to the twentieth century.

Native heritage underscores a human past in the valley reaching back to the period of deglaciation as well as a continuity to the present Six Nations who came to the Grand River in 1784.

The "cultural mosaic" is reflected in the variety of European or American groups and individuals who began settling the valley in the late eighteenth century. Today only the Six Nations and the Old Order Mennonites remain as distinct cultures partly outside of the social and economic developments that have shaped the larger Canadian society. The theme of cultural diversity has continued to be significant as more recent newcomers to the region have added to the original mix of British, German, native and others.

Industrial heritage focuses on the common practice of utilizing the river's power for flour and textile mills. In addition the river was used as a means of transportation, particularly on the lower Grand where the river was canalized from Brantford to Port Maitland. The early water-powered industries cast the mould for further industrial development which continues to be of great importance today.

Promotion and Preservation of Human Heritage

In the past few decades there has been a marked increase in the appreciation of and consequently efforts to preserve the human heritage of the Grand River valley. In researching the human heritage resources for this study, it has been possible to capitalize on previous activity and interest which has issued from federal, provincial and local levels.

At the federal level the Canadian Parks Service has been involved in the preservation and management of human heritage in a number of ways. Thus one national historic park (Woodside in Kitchener) and eighteen national historic sites are administered through the National Historic Parks and Sites Branch (see Figure 3 and Appendix B). In some cases a specific heritage resource is associated with the site as in the case of the Mohawk Chapel in Brantford. In other cases only a commemorative plaque or monument has been erected.

In a planning report for the National Historic Parks and Sites Branch, several priority themes are outlined which suggest for the future what type of human heritage resources should be emphasized and developed (Systems Planning Section, 1985: 36-38). One of these priority themes is manufacturing which is a significant aspect of the Grand River human heritage. In addition a National Historic Parks and Sites Branch research study on the Canadian textile industry has identified fourteen significant extant mills in the Grand valley (Leung, 1986).

At the provincial level, through the Ontario Heritage Foundation, over seventy plaques commemorate significant persons, early settlements, the founding of communities, historic events, buildings, institutions and roads in the watershed (see Figure 3 and Appendix B). Brant and Wellington Counties and Waterloo Region are especially well represented with plaques while the lower Grand has only a few and the portion of Dufferin County within the watershed has none at all. The distribution of national and provincial plaques and sites serves as a guideline for significance but also may point out gaps in the designation of heritage resources.

At the local and regional level heritage activity is evident in several archaeological, architectural and historical organizations. Doon Heritage Crossroads in Kitchener, Woodland Indian Cultural Centre in Brantford, and the Radial Railway Museum in Rockwood are among the museums that have been established to preserve,

display and communicate a diverse history and culture to their communities and outside visitors. Besides preserving and creating an awareness of regional heritage, activity has also been directed to planning and development. The Regional Municipality of Waterloo is the only local body presently having an archaeologist on staff to identify and assess archaeological resources. Most of the large and several of the smaller municipalities have a Local Architectural Conservation Advisory Committee (LACAC), which advise their municipalities on the designation and preservation of buildings that have architectural and/or historical significance. Heritage Cambridge, a local chapter of the Architectural Conservancy of Ontario, has been particularly active in researching, promoting and preserving its community's heritage.

With regard to industrial heritage, several 19th century mills have been restored and in many cases converted to other uses such as restaurants. In Cambridge and Guelph mill ruins have been preserved and developed into riverside parks. In this way the historic significance of the river to many communities is being affirmed. This affirmation has often come with a view to benefiting the community economically through tourism as well as providing a more aesthetically pleasing urban river environment. For example, the town of Haldimand is highly interested in reviving river navigation on the lower Grand, hoping to attract recreational and pleasure boat traffic as a boost to the local economy. Similarly, the historic significance of the river to Brantford is being recognized through the development of a bicycle/walkway system along the river, canal and Mohawk Lake.

In summary, the above outline gives some indication of the scope of interest and involvement in the Grand's human heritage. The river's historical significance is not only recognized in many communities but in various ways is again being underscored as a significant and valuable feature of the human environment.

Concept of a Canadian Heritage River

While the Canadian Heritage Rivers System identifies natural heritage, human heritage and recreational significance as criteria, the emphasis in the system's short history has been on wilderness rivers as against rivers such as the Grand that are marked by much human activity. The study and promotion of the Grand as a Canadian Heritage River consequently represents a test case for the system.

The Grand River Heritage Study may be "rowing against the current" of prevailing Heritage River concepts; yet it is maintained that human settlement and development along river systems is as significant an aspect of our Canadian river heritage as is the image of an unspoiled wilderness.

PATTERNS

Patterns of human heritage resources in the Grand River watershed are discussed below in terms of structure and process. These patterns are discussed in the two separate categories of archaeological and historical resources.

Archaeological Resources: Patterns of Structures

Before examining the distribution of archaeological sites in the watershed, it is important to realize that the available documented data do not necessarily reflect the entire extent of archaeological resources within the watershed. Rather, these data reflect indicative patterns based on current knowledge and findings. It also should be noted that the

archaeological resources include not only prehistoric sites but also historic native and Euro-Canadian sites. In this section, the emphasis is on prehistoric and historic native heritage.

The study area includes approximately 820 sites with the overwhelming proportion of sites located from Kitchener-Waterloo south in a fairly even distribution (see Figure 1 and Appendix A). Site evidence shows that humans were occupying the Grand valley as early as the Palaeo-Indian period (ca. 9000 B.C. to ca. 5000 B.C.). These earliest inhabitants were dependent upon big game animals for food. It was not until the introduction of agriculture during the Woodland period that a more stable and settled population took hold, although hunting remained an important economic pursuit. A summary of the main characteristics of each cultural period is given in Table 1.

In terms of spatial distribution, Palaeo-Indian sites are found primarily in the lower Grand region - notably in Onondaga and North Cayuga townships. Archaic sites, the most commonly documented cultural affiliation, are again well represented in the lower Grand with significant concentrations also in Waterloo Region and the Nith valley in Blandford-Blenheim Township. Woodland cultural sites follow a similar distribution pattern to that of the Archaic, although there are significantly less Woodland sites in Haldimand-Norfolk. Historic native sites, which are relatively few in number, are largely found in Brant County and Hamilton-Wentworth Region, which corresponds also to the location of the historic Neutral population as noted in the ethnographic literature. Finally there are some 350 sites, a sizeable proportion of total sites, with undetermined affiliations or for which data do not exist. Most of these undetermined sites are located in Haldimand-Norfolk.

Site types include villages, campsites, burials or often just a findspot. From the resource data obtained, a majority of sites were either undetermined or no data for type were given. In terms of villages, the greatest concentration dates from the Woodland cultural period and predominates in Brant and Hamilton-Wentworth with another significant area of settlement being the Nith valley in Blandford-Blenheim and Wilmot Townships. Fewer villages have been discovered in the lower Grand and Paris-Waterloo corridors. Historic Neutral villages are overwhelmingly concentrated in the Brant and Hamilton-Wentworth area. Burials and ossuaries often associated with village sites are distributed fairly evenly throughout the general site pattern with somewhat more burials found in the Nith Valley and Waterloo Region. The few historic Neutral burials or ossuaries, however, are found generally in Brant County.

In summary, in terms of structures, the watershed presents a wide variety of archaeological resources dating from the Palaeo-Indian to historic periods. The incompleteness of data and undetermined status of some sites prevents a more complete picture but denotes the potential yet to be more fully researched and evaluated.

Archaeological Resources: Patterns of Process

Process features for archaeological resources are mainly viewed as trading networks, canoe and portage routes, cultural development and routes of native-European contact. A general summary is given below.

In prehistoric times, native inhabitants appeared to make use of several water routes in journeying from northeast to southwest across the southern Ontario peninsula. One route is described adjoining the Grand near its headwaters and proceeding from there to a point at which portages were made to the Nith and similarly from the Nith into the Thames River system. There is evidence also of portage routes from the Conestogo to the

TABLE 1
Southern Ontario Prehistory

<u>Cultural Period</u>	<u>Time Period</u>	<u>Description</u>
Terminal Woodland	1650 AD	Destruction of Neutral Villages and Dispersal
		<i>Ontario Iroquois Cultures (Neutrals in Grand Valley)</i>
		<ul style="list-style-type: none"> - large sedentary populations - large palisaded villages - corn agriculture (also beans, squash) supplemented by hunting and fishing - tobacco cultivation and pipe smoking complex - longhouse construction - bundle burials/ossuaries (bone burials) - widening trade relations toward historic period
	900 AD	
Initial Woodland		<i>Princess Point Culture</i>
		<ul style="list-style-type: none"> - influences from Hopewell culture of Ohio Valley - widening trade relations - introduction of corn agriculture
		<i>Saugeen-Point Peninsula Cultures</i>
		<ul style="list-style-type: none"> - continuation of Archaic lifeways INTRODUCTION OF POTTERY
	1000 BC	
Archaic		<i>Laurentian Culture</i>
		<ul style="list-style-type: none"> - first appearance of stone and copper tools - dog burial - village cemeteries - seasonal hunting (large and small game) and fishing - wide trade relations
	5000 BC	
Palaeo-Indian		<i>PLANO CULTURE</i>
		<ul style="list-style-type: none"> - weak representation
		<i>CLOVIS CULTURE</i>
		<ul style="list-style-type: none"> - earliest evidence of humans in Ontario - big game hunters
	9000 BC	

Avon (Hunter, 1927: 264-67). Numerous campsites found throughout the watershed are probably also indicative of trading and hunting expeditions.

The earliest inhabitants depended upon big game animals for subsistence, but by the late first millennium A.D. corn agriculture had been successfully introduced leading to larger, sedentary villages and larger populations that could be supported. Other crops such as tobacco, sunflowers, beans and squash were added with hunting still forming a part of their subsistence. Trade by these agricultural people with distant areas appears not to have been common until the historic period where the evidence is marine shells. Defence was an important factor in village location, evident in the location of palisaded villages on small tributaries of navigable rivers in usually rather inaccessible positions. Due to soil exhaustion, villages were periodically moved to more suitable agricultural areas. Burials, and later ossuaries, initially located in the village, were by the Historic Neutral period generally located a distance away (Wright, 1966).

By the time of European contact, the Neutral (or Attiwandaronk) population had shifted eastward from central southwestern Ontario to a region generally defined as from east of the Grand River to the western end of Lake Ontario (see Figure 1). The Neutrals had little direct contact with the French fur traders and missionaries who had established themselves among the Hurons, but received European goods through trade with Huron middlemen. The French effect on the Neutral population was, however, felt strongly by the transmission of deadly European diseases such as smallpox ca. 1630. The Neutrals were especially known for the tobacco they grew and also exported chert, seashells, black squirrel and raccoon skins. Trade was also carried on with the Eries to the south and the Ottawas who lived to the north (Heidenreich, 1976: 13).

Trade and military relations were intertwined. With the help of Ottawa allies, the Neutrals were in the early historic period engaged in warfare against the Fire Nation in Michigan while they remained neutral (hence the name given by the French) in the increasing tension between the Hurons, allied with the French, and the Iroquois Confederacy, allied with Dutch traders in New York. However, in 1650-51 the Neutrals were attacked and dispersed by the Iroquois Confederacy and their homeland became the hunting territory of the Iroquois and subsequently the Mississaugas.

French contact with the Neutrals was limited by the Hurons who jealously guarded their trading relationship as middlemen in the fur trade. Two missionary expeditions from Huronia in 1626 and 1640 to the Grand River area were consequently unsuccessful. A later French missionary expedition led by Father Galinée passed through the former Neutral homeland in 1669 on the way to the Mississippi. In order to avoid the falls on the Niagara River, the expedition canoed along Lake Ontario to Burlington Bay where a trail was taken to the Grand to some point near Glen Morris, from which they descended the Grand to its mouth at Lake Erie (Johnston, 1964: 22-24). As such, they were the first Europeans known to descend the river to its mouth.

Historic Resources: Patterns of Structure

To indicate general structural patterns, the watershed can be envisioned as six areas: the lower Grand/Brantford, Paris, Cambridge, Kitchener-Waterloo, Elora/Fergus, and Guelph/Eramosa.

Lower Grand/Brantford: This area illustrates all three themes of native heritage, cultural diversity and industrial heritage. Historic resources strongly accentuate the theme of native heritage particularly in the Brantford area, while industrial heritage is linked especially to the two canal systems that made river navigation possible in the 1830s.

The cultural diversity theme is represented in this area by the Loyalists who, with their fellow Loyalists the Six Nations, were the first settlers in the Grand valley in the late 18th century since the Neutral dispersal in 1650-51.

While archaeological sites testify to a vital prehistoric and early historic native culture in this area, historic resources such as the Mohawk Chapel, the Mohawk Institute, the site of the Mohawk Village, the site of Brant's ford, Chiefswood, the Salt Springs Church and the Six Nations Reserve reiterate this native heritage. As a result of the Haldimand Grant in 1784 (commemorated with a plaque at Cayuga), the Six Nations Indians left their native New York as Loyalist refugees from the American Revolution, and settled along the lower Grand from Brantford to the mouth. The main settlement was the Mohawk Village near Brant's ford, the latter so called after their leader, Joseph Brant. A church, school and mill were built here in 1785 for the Indians and today the church - the Mohawk Chapel - remains as a significant historic resource. Its significance is increased as it was the first Protestant church built in Ontario and since 1904 has had the distinction of being the only royal Indian chapel in the world. Perhaps more than anything else, the historic resources of the Six Nations such as the Mohawk Institute and Salt Springs Church represent the theme of how native culture was quickly confronted with white European culture. Echo Villa and Chiefswood and their respective lives of Rev. Peter Jones, the Ojibwa missionary, and E. Pauline Johnson, the famous poet, are also reflective of this theme.

Other Loyalists came to this area as well. They were given "Brant leases" to land along the Grand. A plaque commemorating the 1785 Nelles settlement at York represents this aspect. The areas west and east of Brantford - Jerseyville, Mount Pleasant, Burford, Princeton, Oakland and Scotland - were also initially settled by Loyalist families in the 1790s and early 1800s. At this point it is not certain what, if any, historic resources represent this Loyalist heritage. As well, these areas are peripheral to the Grand River proper.

The opening up of the lower Grand to river navigation in the 1830s and 1840s was contemporaneous with final Six Nations land surrenders that saw the Indians moving to their present reserve lands and a subsequent increase in white settlement. Brantford, at the head of navigation, received an economic boost while other river towns such as Dunnville and Caledonia were founded as canal towns. Other villages like Indiana, Middleport and Newport rose and fell with the fortunes of the canal.

River navigation using the Grand was actually the result of two projects that were substantially the brainchild of one man, William Hamilton Merritt. Merritt is known for building the Welland Canal, but the feasibility of the first Welland Canal was dependent upon a canal feeder supplying water from the Grand to the Welland. This canal feeder or feeder canal, as it was also used for shipping, still remains today (except in Dunnville) although no longer used for its original purpose. Completed in 1829, the feeder connected with the Grand at Dunnville where a dam has been constructed. In order to facilitate access around this dam to the river mouth, a canal channel was also constructed at a later date from Stromness to Port Maitland. Locks along this portion still remain. The waterpower supplied by the canal gave rise to milling enterprises in Dunnville which, however, are no longer extant. Shipbuilding was also an important activity at Stromness.

The Grand River Navigation Company, chartered in 1832, was the second canal project that in its final construction phase allowed river navigation from Brantford to Dunnville and from there via the feeder canal to Lake Erie. Lumber, wheat, gypsum and livestock were shipped via the river and canal cuts to Buffalo or via the Welland Canal to Lake Ontario ports. Passenger boat excursions to Buffalo were also made. As with the feeder canal, waterpower was made available for industry. Numerous industries grew up

along the canal banks in Brantford and in other river ports. The Grand River Mill in Caledonia remains as an example of this heritage. The railroads spelled the beginning of the end of the canal system in the 1850s. The ghost village of Indiana, situated between Cayuga and Caledonia, is an example of this economic boom and withdrawal. Today only Ruthven, the riverbank estate of David Thompson, a prominent entrepreneur, recalls a more prosperous era.

Several other noteworthy historic resources should be pointed out in Brantford. While the canal ceased to function as a transportation route, it was utilized in other ways. The ruins of the Watts' powerhouse (originally a mill) at the locks site remains as one of the first electric projects (1885) to light a Canadian city. The canal and Mohawk Lake as well as the river itself were popular for canoeing and ice skating at the turn of the century. The Massey foundry (1882) stands along the canal banks providing, as it were, a link between an earlier industrial chapter of canal industries and the later chapter of agricultural implement manufacturing which made Brantford famous. On the Grand River itself the Slingsby and Watson Mills remain as part of the textile industry that was common to the valley. Slightly upriver are the Indian dam ruins and the Wilkes dam which supplied waterpower, the latter now part of the Brantford waterworks.

Paris: Paris illustrates the two themes of cultural diversity and industrial heritage. Located at the confluence of the Grand and Nith and divided into upper and lower towns, Paris received much of its initial start through American settlers and entrepreneurs. Paris was founded around 1830 by Hiram Capron, a native of Vermont whose first home still stands. Capron realized the potential of the river power and the abundant gypsum or plaster of Paris deposits that gave the settlement its name. Though the plaster mills do not remain, many houses do which were constructed with this local product, including the Asa Wolverson house which has been provincially plaqued.

Perhaps more outstanding than the local plaster are excellent examples of the cobblestone building technique introduced into Paris in the late 1830s by a New Yorker, Levi Boughton. Examples of cobblestone buildings are the Paris Plains Church (provincially plaqued), St. James Anglican Church and Hamilton Court which backs onto the Grand River.

The importance of the textile industry in Paris was long associated with Penman's. Two knitting mills still stand: Penman's No. 1 built in 1874 on the Nith and No. 9 built ca. 1900 on the Grand. Penman, who was also an American and of Scottish descent, remodelled the second home of Hiram Capron into a Victorian mansion. "Penmarvian" still commands a view of the river and the town.

East of Paris is the village of St. George which is chiefly significant for the Adelaide Hunter Hoodless Homestead, the birthplace of the founder of Women's Institutes.

Cambridge: Like Paris, and to a larger extent, Cambridge represents an excellent example of both cultural and industrial heritage. Cambridge is actually a new city taking in the older towns of Galt, Preston and Hespeler, as well as the village of Blair. Galt, with its granite fieldstone and limestone buildings and its two Presbyterian churches, reflects its 19th century Scottish heritage. Examples of Galt's grey granite buildings are the Galt Town Hall (provincially plaqued) and Hume's Block. Dickson Mill and Mill Race Park represent part of the town's industrial heritage based upon the waterpower of the Grand River. The Dumfries Foundry on the west bank was a precursor of the larger industrial concern of Goldie & McCulloch, now Babcock & Wilcox, still a leading manufacturer and employer in the city.

Preston, near the confluence of the Grand and Speed, was originally settled by John Erb, a Pennsylvania-German Mennonite, who established a saw mill and grist mill by 1807. The Dover Flour Mills, on the Erb site, structurally date from 1894 and continue the milling tradition with modern methods. Extant woollen mills, foundries and furniture factories represent some of Preston's industrial heritage and German cultural background. Preston was also an established mineral spa resort with three hotels operating at the turn of this century. The Preston Springs, now a retirement home, still stands on the north side of the Speed.

Hespeler, upstream from Preston on the Speed, has a rich heritage based on the textile industry. At one time the town's major industry, the large mill (Silknet) still stands and structurally incorporates several periods of expansion from the 1870s. The original mill of Jacob Hespeler, the town's founder, is also still standing. With original workers' houses and Hespeler's own residence on the opposite northern side of the Speed overlooking his concerns, an interesting picture is formed of a flourishing 19th century industrial town based upon the power of the river.

Blair, the fourth community of Cambridge, is much smaller but no less significant. Some of the earliest Mennonite settlement took place in this area; some typical Mennonite homes built in the Georgian style still stand. Blair also has the oldest cemetery in Waterloo County, its earliest grave dating to 1804. Evidence of Blair's milling heritage, so common to all of the valley, remains with Blair Mills and Sheave's Tower.

Kitchener-Waterloo: The historic resources of this area centre upon the cultural diversity theme. The industrial heritage theme is less stressed because the Grand was markedly less significant in the development of Berlin (Kitchener) and Waterloo. While the early settlers and entrepreneurs in Galt and Hespeler harnessed the river's power for mills, the Pennsylvania-German Mennonite settlers who took up land along the Grand were more interested in agriculture. Moreover, they preferred the isolation that the middle Grand valley offered in the early 1800s. Hence when German artisans from Europe began arriving in the 1830s, they were attracted to the settlement of Berlin away from the river where they initiated an industry primarily based on steam power. This technological orientation together with a distinctive German ethnicity was a strong factor in Berlin's and Waterloo's social and economic development, which was rather self-contained and unrelated to other towns in the valley such as Galt and Guelph. Berlin's name change to Kitchener during the First World War symbolized an accelerated pace of acculturation to the larger Canadian society.

Waterpower was, however, important in the surrounding villages such as Doon and St. Jacobs. Doon was established as a major milling centre in the 1830s; the ruins of the Ferrie Mill remain as the last vestige on the landscape. At Doon also, the Canada Company's "colonization road" - the Huron Road - built in 1828, crossed the Grand River. The natural beauty of Doon and the Grand valley together with the early mills was celebrated in the paintings of the famous Canadian landscape painter, Homer Watson. St. Jacobs is significant for the revolution in flour milling methods that took place there. The Snider Mill of St. Jacobs was the first mill in Canada to use the roller method rather than the traditional grindstone. While the millrace along the Conestogo River still remains, the mill which stands today in St. Jacobs is from a later date. E.W.B. Snider, who pioneered this method, is also remembered for the role he played in bringing public hydroelectric power to Ontario.

However, the Kitchener-Waterloo area is perhaps best known as the centre of the valley's Pennsylvania-German Mennonite cultural heritage. The surrounding rural landscape, with its villages and Old Order Mennonite farms, is a historic resource as a

whole. Old Order Mennonites north of the city of Waterloo continue their folk traditions while villages like Maryhill, with its large church, reflect German Catholic roots. At West Montrose the only remaining covered bridge in Ontario spans the Grand. To the south, opposite Doon, Joseph Schoerg settled in 1800 as one of the area's first two Mennonite settlers. The Pioneer Tower was erected at this location to commemorate the historic Mennonite migration from Pennsylvania to Waterloo.

In Kitchener-Waterloo itself historic resources include Woodside National Historic Park, the Victorian home of William Lyon MacKenzie King; the Joseph Schneider House, a restored 1820 home of an early Mennonite family in Kitchener; and the Seagram Distillery and Museum, indicative of the strong distilling and brewing tradition in Waterloo.

Elora/Fergus: The Elora/Fergus area accentuates the themes of cultural and industrial heritage. The historic resources of Elora and Fergus can be summed up in their limestone buildings and their early industrial dependence and foundation upon waterpower. Several mills still stand in the area including the Elora Mill, perhaps the most striking in its river location, the Wilson Mills in Fergus, and two mills in Salem, just north of Elora. Fergus, like Galt and Guelph, began as the project of a Scottish proprietor. Some of these Scottish roots are evident in the Beatty Foundry enterprise, St. Andrew's Presbyterian Church and the Fergus Curling Club (the latter two are provincially plaqued). Elora, with the mill and the industrial ruins on the opposite side, is a good example of an industrial town that did not develop significantly beyond the waterpower age, declining instead of growing with the coming of the railroad to the town in the 1870s.

North of Fergus at Belwood is the Shand Dam, which is a historic resource of a different kind. The dam, built in 1942, was the first multi-purpose dam built in the watershed and Canada, and marks the historic development of conservation and new recreational resources in the watershed.

Guelph/Eramosa: The Guelph/Eramosa region is not on the Grand River proper but rather on its tributaries, the Speed and the Eramosa. Founded in 1827, Guelph is noteworthy for its historic connection with the Canada Company, a land settlement scheme initially headed by the Scot, John Galt. Guelph was surveyed and laid out as a planned community with high visions and expectations on the part of its founders. To a great extent, the fine stone architecture of its civic, commercial and religious buildings has incorporated this vision. Examples are the Guelph City Hall and the Church of Our Lady. As with other settlements, Guelph's early growth was dependent upon waterpower. Three mills still exist upon the banks - two only as ruins that have been restored into park areas. As with other growing centres, Guelph expanded its original water-powered industry into a more diverse manufacturing sector. At the end of the 19th century Guelph was particularly noted for its piano, organ and sewing machine factories. Also in Guelph, near the Speed River, is the birthplace of Col. John McCrae, the World War I poet who wrote "In Flanders Fields".

To the east of Guelph is Eramosa Township. A considerable number of water-powered grist and woollen mills have survived along the Eramosa River at Eden Mills, Rockwood and Everton.

Historic Resources: Patterns of Process

Historic process patterns dealt with here involve the evolution of settlement and urban growth as well as the development of primary transportation corridors. Reference can be made to Figures 4, 5, and 6.

Settlement and urban growth were, in the initial phase, greatly dependent on the river system for agriculture, industrial power and transportation. Sawmills were quickly founded and for many years the river was used to float logs down to mills. The major urban centres grew as new forms of industrial technology replaced waterpower and as railways opened up more distant markets. This phase, beginning in the 1850s with the railways and with the predominance of steam in most industry by the 1880s, represents a "turning away" from the river.

In terms of settlement, the earliest occurred east and west of Brantford in Burford and Ancaster Townships, with settlement also along the lower Grand River where the Six Nations had taken up land. Settlement in Waterloo and Dumfries followed in the early 19th century. By the 1830s other river communities including Paris, Caledonia and Dunnville had been founded to the south along with Elora, Fergus and Guelph to the north and east. Settlement in the upper watershed did not commence until the 1840s and some areas like Luther Township were only beginning to be cleared and developed around 1870. By the turn of the century, due to such factors as industrialization and the opening up of the Canadian West, urban areas grew while rural areas such as North Wellington lost population.

Cultural patterns of settlement took hold in some areas with European Germans and Pennsylvania-German Mennonites in Waterloo, Amish in Wilmot, Scots in Dumfries and Nichol, Irish in North Wellington and Dufferin, Loyalists in the south, and quite a bit of American influence in Paris. In other areas less homogeneous settlement was evident from the start as in Brantford. Negro settlement in Peel and Wellesley townships, while modest, was displaced by other groups while Pennsylvania-Germans expanded west and north into Mornington, Wellesley and Peel townships. By 1847 the original Six Nations settlements had been contracted to the present reserve.

In terms of transportation corridors, the region had from the beginning of its settlement in the late 18th and early 19th centuries an orientation towards the east, particularly toward Dundas and Hamilton at the head of Lake Ontario. Early roads, still evident in the provincial highways system, connected river communities from Caledonia to Guelph in a radial pattern to the hub at Dundas/Hamilton. Other settlements became centres for rural hinterlands. Elora, until the advent of the railways, was the agricultural market centre for the settlement area stretching to the north while communities like Galt profited from the opening up of Canada Company lands to the west. The lower Grand region from Brantford south was partly oriented to the Buffalo/Lake Erie area through the Grand River canals system.

With the coming of the railroads some of these patterns were reinforced while others were reoriented. The Grand Trunk system created an economic corridor connecting Toronto with Guelph, Berlin and points west. The Great Western maintained a link between Paris and Hamilton with a line also reaching out to Galt. The Buffalo and Lake Huron railway effectively ended river navigation but retained the economic ties between Brantford and Buffalo. A second railway boom in the 1870s resulted in every major community from Grand Valley to Dunnville having some rail connections. The railways brought some communities into existence, reinforced the growth of some, and retarded the growth of others. By the early 20th century a third railway-building phase

emerged with the construction of inter-urban electric lines which, in the case of the Grand River and Lake Erie and Northern Railways, connected river communities from Kitchener to Brantford, following rather than crossing the river valley.

However, the traditional orientation to eastern metropolises outside of the watershed is still present in the east-west pattern of major transportation corridors such as Highway 401. This pattern tends to fragment rather than unite the valley as a coherent whole.

AREAS OF SIGNIFICANCE

Various sources were consulted in order to get some grasp of how to decide on significance. Even after this was done, it was difficult to judge comparatively with other provincial and national regions the merits of the human heritage of the Grand River valley. As such the estimations of significance are only indicative and open to re-evaluation. Human heritage resources were evaluated by ten geographic clusters (see Figure 7) rather than by each individual resource.

Four criteria dealing with historic significance and one with archaeological significance were used to determine total significance. The first two criteria used were national and provincial significance of a given resource. This was indicated from the extent of already recognized nationally or provincially significant sites and resources (see Appendix B). In some cases resources were rated as nationally or provincially significant by association with an historical resource elsewhere. For example, the feeder canal is considered nationally significant because of its association with William Hamilton Merritt and the first Welland Canal, which are recognized as nationally significant. A third criterion of regional significance took in those resources with social, political or economic impacts felt primarily in the watershed or a region of the watershed, and which have not been recognized as either nationally or provincially significant. For example, the impact of the Grand River Navigation Company and most flour mills was felt primarily regionally.

River significance was used as a fourth criterion since human heritage is being considered within the context of the Grand River. If a resource was considered functionally related or geographically near to the river, then it was considered to have river significance. This factor tended to balance out scores, lowering total significance in Kitchener-Waterloo and raising it in the lower Grand where most of the resources considered were strongly associated with the river. It also underlined the significance of Brantford which has many nationally and provincially significant sites or resources, many of which have an association with the river.

Finally a simple high or low value was assigned to clusters of significance in dealing with archaeological resources. If an area had large concentrations of sites it was given a high value, and if an area had few or no sites it was given a low value. This course was taken as no clear criteria for site significance have as yet been defined and applied, according to a provincial Ministry official. The site of an Indian village may well be significant, but so may be a campsite which is the only one representing a certain cultural period. A wider archaeological knowledge would be needed to make such judgment calls.

The first four criteria were then applied to the sites or resources of each area. Arbitrary descending numeric values of 1.5, 1.0 and 0.5 were given to national, provincial and regional significance respectively, with a site or resource usually meeting only one of these criteria. If a resource was "river significant" an additional value of 2.0 was added. The sum of the scores for each site or resource was then derived with an additional high

(2.0) or low (1.0) value added for archaeological sites to give a total significance for the area. An example of this evaluation scheme is given for the lower Grand region in Table 2.

The total evaluation of all areas is included in Appendix F, with areas mapped according to primary, secondary or tertiary significance based upon the total scores (Figure 7). A list of outstanding features associated with the river in each area is given in Table 3.

The above method may follow more of a quantitative line of evaluation rather than a qualitative approach, but this is partly inherent in clustering resources rather than individually evaluating them. Yet qualitative criteria such as rarity, age, or representativeness are in many cases already reflected in the categories of national, provincial or regional significance. For instance, in terms of rarity and age, the Mohawk Chapel in Brantford is indeed highly significant and this is reflected in its designation as a national historic site. Similarly, the Grand River Navigation Company, in comparison with other contemporary canal projects that characterized the age of "canal fever" such as the Welland, the Trent and Rideau, does not rate as high. But at the same time it was very significant at a regional level and is inextricably linked with the Grand.

CONSTRAINTS

Areas of constraint have been mapped as general and specific tension areas (Figure 8).

Archaeological sites are generally subject to constraints posed by current land uses or land use changes that disturb sites. Some examples of this are urban expansion, aggregate extraction or the construction of dams and reservoirs. As well, natural age processes affect the condition of sites. Archaeological sites may also, and have in the past, been disturbed by persons with no archaeological training, thus affecting or destroying the integrity of the site.

With regard to historic structures there is the familiar scenario of preservation and integrity versus destruction, modification or the negative impact of surrounding land uses. Usually such confrontations are worked out over the issues of financial cost, management, utility as a heritage structure, aesthetic appeal, and community benefit in terms of a cultural, recreational or tourism resource. Historic structures, especially those

TABLE 2:

Lower Grand Historic Resources/Site

	N	P	R	RS	TOTAL
Contains route of Dollier-Galinée Expedition	1.5			2.0	3.5
Feeder Canal	1.5			2.0	3.5
Grand River Navigation Company			0.5	2.0	2.5
Ruthven/Indiana			0.5	2.0	2.5
Grand River Mills			0.5	2.0	2.5
Grand River Naval Depot		1.0		2.0	3.0
Haldimand Grant		1.0		2.0	3.0
Nelles Settlement		1.0		2.0	3.0
Subtotal	3.0	3.0	1.5	16.0	23.5
Archaeological Sites (High)					2.0
	3.0	3.0	1.5	16.0	25.5

N = of National Significance
P = of Provincial Significance
R = of Regional Significance
RS = of River Significance

The key requirement for management should aim at both preservation and development. Where possible this should be done integratively, reflecting a continuity of the past with future changes - a balanced coordination of old and new. Perhaps a good example of this is a 19th century distillery building located on the Speed River in Guelph that has been preserved, restored and incorporated into the ongoing functions of a manufacturing company.

Of particular concern is the position of the Six Nations Indians towards the concept of the Grand as a Canadian Heritage River. The issue of native self-government cannot be passed over lightly nor can present and previous claims. It is important, in recognizing the Grand River canal system as a heritage resource and the potential of reviving river navigation, that the historic claims of the Six Nations are not overlooked (Ontario History, 1971: 31-40).

Finally, and perhaps above all else, the degree of public commitment, support and enthusiasm for Canadian Heritage River designation should be considered.

APPENDIX A:**Summary of Archaeological Characteristics*****Cultural Affiliation of Sites**

Palaeo-Indian	23 sites
Archaic	268 sites
Woodland	175 sites
Historic, Native	27 sites
Historic, European	35 sites
Undetermined	214 sites
No data	146 sites

Type of Site

Village	66
Hamlet	5
Camp	169
Workshop	65
Burial	19
Cemetery	3
Ossuary	7
Midden	4
Quarry	5
Earthwork	1
Findspot	90
Historic, Commercial	3
Historic, Homestead	15
Gaol	1
Undetermined	114
No data	322

* **Source:** Archaeological Unit, Heritage Branch, Ontario Ministry of Culture and Communications.

TABLE 3:
**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

no longer in use, are subject to natural stresses such as structural decay or flooding. In addition neglected historic structures are more at risk of arson or vandalism damage. Since the historic structures referred to in this report are generally located in urban areas, these areas have been marked as general tension areas. Kitchener-Waterloo, Cambridge, Guelph and Brantford are particularly high constraint areas due to growing urban and industrial expansion.

There is also potential constraint in the development of human heritage resources. When a community takes an interest in its heritage, the heritage resources may be developed in an unsuitable way such that the integrity of the resource is put at risk or stress in community relationships develops. Specifically, how would the revival of river navigation on the lower Grand affect the extant original canal features, if at all? How would such a plan be conceived by the Six Nations Indians who have an historical claim against the original navigation company and who are presently making claim to the bed of the Grand River where it flows through the reserve?

While less river-oriented, a specific tension area was also noted in the northward spread of the city of Waterloo into the surrounding Mennonite countryside. The scenario of urban expansion versus agricultural land use is made more critical by the risk of a unique cultural landscape being gradually altered or destroyed.

MANAGEMENT ISSUES

Perhaps the central question is, how would the Grand River be managed as a Canadian Heritage River? Who would be the manager? Is this a role the Grand River Conservation Authority would assume? How would such a concept and plan fit into the policies and plans of the several municipalities which comprise the watershed? Would the entire river be designated or would it be feasible to designate certain segments only?

Additional questions are raised concerning human heritage resources. Perhaps the first is that of resource integrity. What is the state or condition of a given resource relative to the time period or theme for which it is considered significant? How significant is the resource in relation to the river? The potential for resource development should then be considered as well. What can be done with a ruined or abandoned mill? How can the themes of native, cultural, industrial heritage and possibly others be represented, preserved and interpreted?

From the writer's viewpoint, industrial heritage has great development potential. It reflects well the regional character and touches base with the common and near experience rather than highlighting the distant past, a famous person or military engagement. New focus is also being directed to this aspect of our past as is evident in the relatively recent field of industrial archaeology. Dianne Newell highlights the educational potential of our industrial heritage which touches not only upon history but also science, technology and economics (*History and Social Science Teacher*, 1983: 227-234). Industrial heritage, while drawing attention to the negative impact on river systems, can also serve as an educational opportunity to draw attention to sounder management of the environment. One example of how industrial heritage has already been represented is the Seagram Museum in Waterloo.

The question is also raised, how can the disjunctive heritage features be linked together to give a coherence to the valley's heritage? A trail system? A parkway? Recreation, as a component of the river's heritage, can serve as an important link.

Ohsweken	Capt. John Brant 1794-1832 Tom Longboat 1886-1949 E. Pauline Johnson 1861-1913*
LOCATION	PLAQUE
Brantford	St. Paul's, H.M. Chapel of the Mohawks* The Founding of Brantford Brant County Court-House* Augustus Jones Rev. Peter Jones 1802-1856* Sara Jeannette Duncan 1861-1922 Honourable Arthur Sturgis Hardy 1837-1901 'Mohawk Village' Lawren Harris 1885-1970 Canada's First Telephone Business Office* The Mohawk Institute 1831* William Charles Good 1876-1967 The Grand River Mission* The Honourable George Brown 1818-1880* The Ontario School for the Blind* The Royal Canadian College of Organists
Mount Pleasant	Dr. Augusta Stowe-Gullen 1857-1943
Oakland	Battle of Malcolm's Mills 1814
Scotland	Duncombe's Uprising 1837
Paris	'King' Capron 1796-1872* Paris Plains Church 1845* The Asa Wolverton House*
St. George	The Honourable Harry C. Nixon 1891-1961 Adelaide Hunter Hoodless 1858-1910*
Princeton	Colonel Thomas Hornor 1767-1834
Wolverton	Wolverton Hall*
Cambridge	Founders of Galt Honourable James Young 1835-1913 Tassie's School Galt City Hall* The Founder of Preston
Kitchener	The Huron Road* Bishop Benjamin Eby 1785-1853 William Lyon MacKenzie King 1874-1950* The Joseph Schneider House 1820*
Waterloo	Abraham Erb 1772-1830 The University of Waterloo* Waterloo Lutheran University* Evangelical United Brethen

APPENDIX B:

Historic Sites

National Historic Sites**LOCATION****SITE**

Ohswegen	The Six Nations Tom Longboat Pauline Johnson* Thayendenaga (Joseph Brant)
Brantford	Invention of the Telephone* Arthur Sturgis Hardy Her Majesty's Chapel of the Mohawks*
St. George	Adelaide Hunter Hoodless*
Cambridge	Otto Julius Klotz
Kitchener	Waterloo Pioneers William Wilfred Campbell Archibald McKellar MacMechan William Lyon MacKenzie King* Homer Watson*
Waterloo	Joseph Emm Seagram*
Guelph	Col. John McCrae* Edward Johnson
Rockwood	James Jerome Hill

* Denotes a related historic resource

Provincial Plaques**LOCATION****PLAQUE**

Port Maitland	Grand River Naval Depot 1815
Cayuga	The Haldimand Grant 1784
York	The Nelles Settlement 1785
New Credit Reserve	New Credit Indian Reserve & Mission

New Hamburg	The Founding of New Hamburg The First Amish Settlement
Baden	Sir Adam Beck's Birthplace
New Dundee	William J. Wintemberg 1876-1941
LOCATION	PLAQUE
West Montrose	The West Montrose Covered Bridge 1881*
Milverton	The Founding of Milverton
Elora	David Boyle, 1842-1911 The Founder of Elora
Fergus	The Founders of Fergus The Fergus Curling Club* St. Andrew's Presbyterian Church*
Arthur	The Founding of Arthur
Guelph	Edward Johnson 1881-1959 John McLean 1799-1890* John Galt 1779-1839 The La Guayra Settlers Ontario Veterinary College* Ontario Agricultural College* Guelph City Hall 1856* Joseph Connolly 1840-1904* The Founding of Guelph Guelph Public Library Henry Langley 1836-1907* Wellington County Court House*
Puslinch Township	The Settlement of Puslinch*
Rockwood	Rockwood Academy*

* Denotes a related historic resource.

APPENDIX C:

Industrial Heritage Sites or Structures (Suggested)

<i>LOCATION</i>	<i>SITE</i>	<i>TYPE</i>
Caledonia	Grand River Mills	Flour Mill
Brantford	Slingsby Mill Watson Mill Massey Foundry Watts Powerhouse	Textile Mill Textile Mill Foundry Electric Powerhouse
near Brantford	Apps' Mill	Flour Mill
Paris	Penman's No. 1 Penman's No. 9	Knitting Mill Knitting Mill
Ayr	Greenfield Mills	Flour Mill
Cambridge	Dickson Mill Dumfries Foundry Galt Woollen Mill Galt Knitting Co. Goldie & McCulloch "Safe" Works Mill Race Park Ruins Hespeler Mill Complex Dominion Woollens & Worsted (Silkknit) Pattinson Woollen Mills Blair Mills	Flour Mill Foundry Textile Mill Knitting Mill Foundry Textile, etc. Textile Mill Textile Mill Flour Mill
Kitchener	Ferrie Mill (Doon)	Flour Mill
Waterloo	Seagram's Distillery	Distillery
St. Jacobs	Snider Mills	Flour Mill
Elora	Elora (Drimmie) Mill Mundells' Furniture	Flour Mill Furniture
Fergus	Wilson Mills Beatty Foundry	Flour Mill Foundry
Salem	Wissler's Mill Erb's Mill	Flour Mill Flour Mill

Guelph	Goldie Mill	Flour Mill
	Allan's Mill	Flour Mill, Distillery
	Phoenix Mill	Flour Mill
Aberfoyle	Aberfoyle Mill	Flour Mill
Eden Mills	Hortop's Mill	Flour Mill
Rockwood	Harris Woollen Mill	Textile Mill
	Hortop's Mill	Flour Mill
Everton	Hortop's Mill	Flour Mill
Birges Mills	Birge's Mills	Flour Mill

APPENDIX E:

Industrial Power, 1871*

CENSUS AREA	GENERAL LOCATION	WATER	Number of Powered Establishments		TOTAL
			STEAM	WATER/STEAM	
Monck	Dunville	6 54.5%	5 45.5%	---	11 100%
Haldimand	Caledonia, Cayuga	21 70.0%	9 30.0%	---	30 100%
Brant South	Brantford	18 42.9%	24 57.1%	---	42 100%
Brant North	Paris	20 58.8%	13 38.2%	1 2.9%	34 100%
Blenheim	Blenheim Township	20 62.5%	12 37.5%	---	32 100%
Ancaster/Beverly	Ancaster Beverly Townships	17 30.9%	33 60.0%	5 9.1%	55 100%
Waterloo South	Cambridge, Ayr, Wilmot	60 57.1%	38 36.2%	7 6.7%	105 100%
Waterloo North	Kitchener-Waterloo	19 30.2%	41 65.1%	3 4.8%	63 100%
Mornington	Mornington Twp.	1 10%	7 70%	2 20%	10 100%

APPENDIX D: Continued

Ethnic Groups, 1871*

CENSUS AREA	GENERAL LOCATION	ENGLISH	SCOTTISH	IRISH	GERMAN	INDIAN	OTHER	TOTAL
Waterloo North	Kitchener-Waterloo	2237 11.6%	1401 7.3%	1548 8.0%	13158 68.3%	---	912 4.7%	19256 100%
Mornington	Mornington Twp.	397 10.4%	758 19.9%	1684 44.2%	874 23.0%	---	95 2.5%	3808 100%
Wellington South	Guelph	4503 31.4%	4962 34.6%	3764 26.2%	906 6.3%	---	212 1.5%	14347 100%
Wellington Centre	Elora, Fergus, Eramosa	5641 24.5%	8195 35.6%	7483 32.5%	1154 5.0%	---	527 2.3%	23000 100%
Wellington North	Arthur, Grand Valley	5097 25.1%	3190 15.7%	10667 52.6%	847 4.2%	---	495 2.4%	20296 100%

* Source: Census of Canada, 1871.

APPENDIX D:

Ethnic Groups, 1871*

CENSUS AREA	GENERAL LOCATION	ENGLISH	SCOTTISH	IRISH	GERMAN	INDIAN	OTHER	TOTAL
Monck	Dunnville	1785 30.7%	499 8.6%	1531 26.4%	1541 26.5%	---	453 7.8%	5809 100%
Halldimand	Caledonia, Cayuga	3201 27.8%	1972 17.2%	3644 31.7%	1509 13.1%	414 3.6%	758 6.6%	11498 100%
Tuscarora	Six Nations Reserve	123 4.7%	35 1.3%	62 2.4%	31 1.2%	2302 88.3%	53 2.0%	2606 100%
Brant South	Brantford	9030 49.7%	3149 17.3%	4128 22.7%	882 4.9%	34 0.2%	937 5.2%	18160 100%
Brant North	Paris	4596 40.0%	2768 24.1%	2624 22.8%	1034 9.0%	32 0.3%	439 3.8%	11493 100%
Blenheim	Blenheim Township	2274 35.5%	1833 28.6%	786 12.3%	1341 21.0%	1 ---	163 2.5%	6398 100%
Ancaster/Beverly	Ancaster Beverly Townships	2901 26.8%	2638 24.4%	2109 19.5%	2493 23.1%	---	667 6.2%	10808 100%
Waterloo South	Cambridge, Ayr, Wilmot	3216 15.3%	5914 28.2%	1672 8.0%	8892 42.4%	---	1301 6.2%	20995 100%

APPENDIX E: Continued

Industrial Power, 1871*

CENSUS AREA	GENERAL LOCATION	WATER	Number of Powered Establishments		TOTAL
			STEAM	WATER/STEAM	
Wellington South	Guelph	9 23.7%	24 63.2%	5 13.2%	38 100%
Wellington Centre	Elora, Fergus, Eramosa	41 66.1%	20 32.3%	1 1.6%	62 100%
Wellington North	Arthur, Grand Valley	12 30%	28 70%	--- ---	40 100%

* Source: Bloomfield Databases, 1871 Manuscript Census.

APPENDIX F:

Total Significance of Areas

Area	N	P	R	RS	A	TOTAL
Lower Grand	3.0	3.0	1.5	16.0	2.0	25.5
Six Nations	7.5	4.0	--	8.0	2.0	21.5
Brantford	7.5	16.0	1.0	16.0	2.0	42.5
Paris	3.0	7.0	--	8.0	1.0	19.0
Cambridge	1.5	6.0	2.5	16.0	2.0	27.5
Kitchener-Waterloo	12.0	9.0	1.0	10.0	2.0	34.0
Nith Valley	--	4.0	--	2.0	2.0	8.0
Elora/Fergus	--	6.0	1.0	10.0	1.0	18.0
Guelph	3.0	12.0	1.0	6.0	1.0	23.0
Eramosa	1.5	1.0	0.5	2.0	1.0	6.0

N = National Significance, having value of 1.5

P = Provincial Significance, having value of 1.0

R = Regional Significance, having value of 0.5

RS = River Significance, having value of 2.0

A = Archaeological Site Concentration, low value of 1.0, or high value of 2.0

Hence, for Brantford; at least 5 sites or resources were considered nationally significant ($5 \times 1.5 = 7.5$); at least 16 sites or resources were considered provincially significant ($16 \times 1.0 = 16.0$); at least 2 sites or resources were considered regionally significant ($2 \times 0.5 = 1.0$); at least 8 sites or resources were considered to have river significance ($8 \times 2.0 = 16.0$); and the area was considered to have a high concentration of archaeological sites (2.0). Total score was then added to give a value of 42.5.

The range of total scores were mapped (Figure 7) according to primary, secondary or tertiary significance areas with groupings as follows:

0	-	12.0	tertiary significance
13.0	-	24.0	secondary significance
over 24.0			primary significance

FIGURE 1



ARCHAEOLOGICAL SITES

SOURCE: Ontario Ministry of Culture and Communications,
Regional Municipality of Waterloo

See also Appendix A

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 8 12
Date prepared - 1988.

-  AREA/CLUSTER OF SITE(S)
-  AREA OF HISTORIC NEUTRAL OCCUPATION (i.e. ca. 1600-1650)

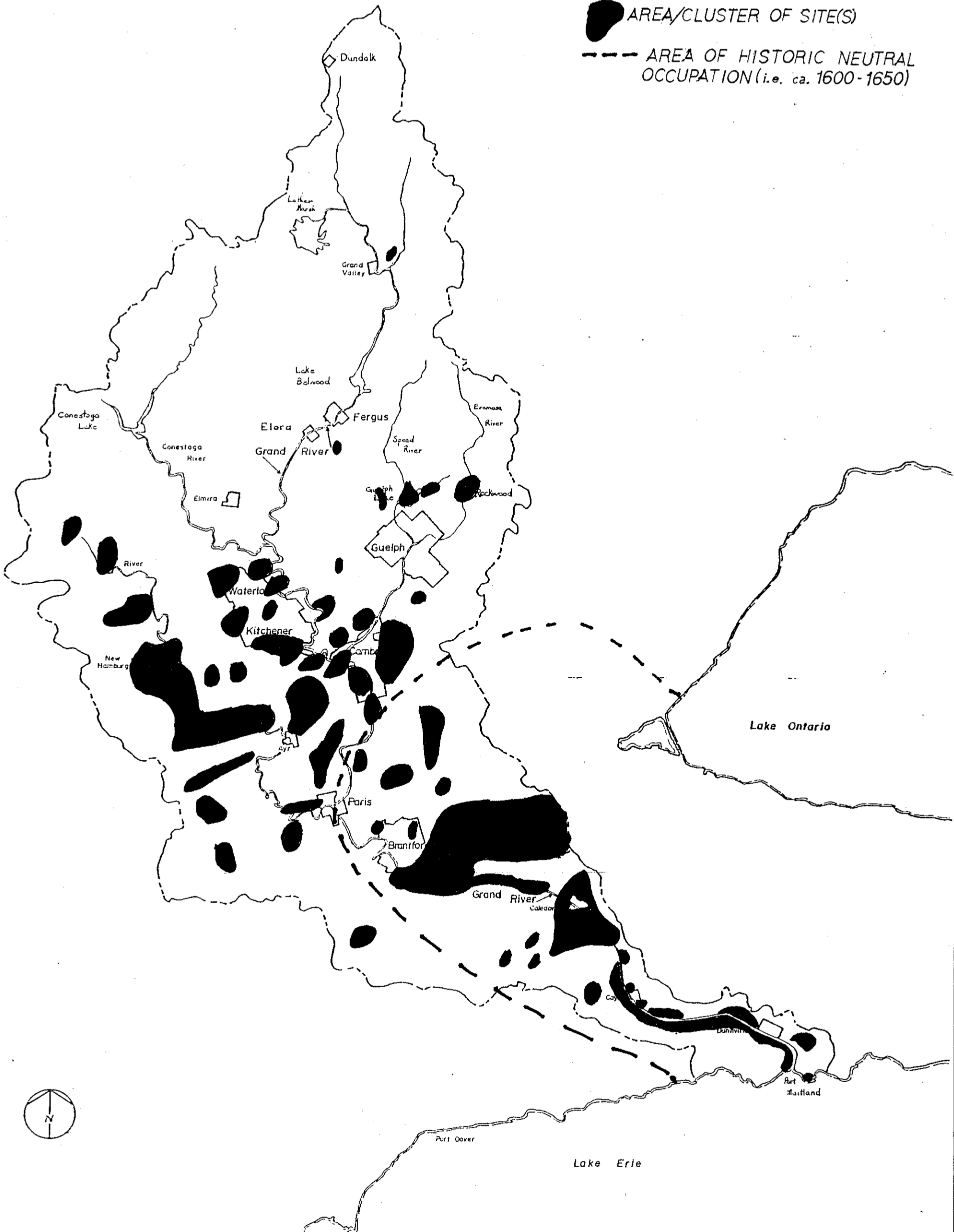


FIGURE 2

HISTORIC NATIVE PROCESSES CA. 1600 TO 1784

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 8 12

Date prepared - 1988.

--- AREA OF HISTORIC NEUTRAL OCCUPATION

1 WARFARE (late 1500s to ca. 1620)

2 TRADE WITH HURON AND FRENCH (ca. 1600 to 1650)

3 WARFARE AND NEUTRAL DISPERSAL (1650-51)

4 MISSISSAUGA OCCUPATION (early 1700s to ca. 1830)

5 ARRIVAL OF SIX NATIONS (1784)

▶▶▶▶ DOLLIER-GALINEE EXPEDITION (1669-1670)

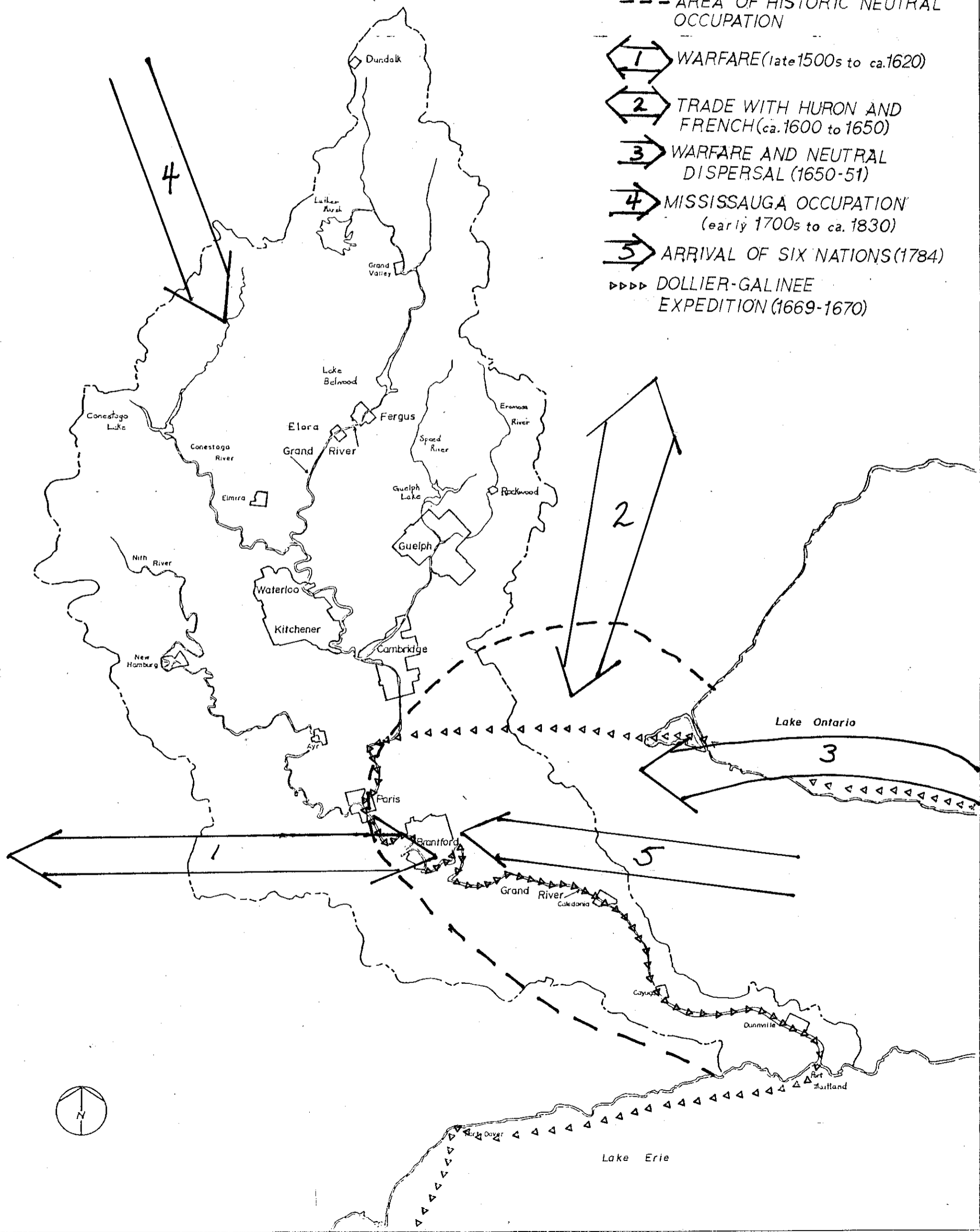


FIGURE 3

HISTORIC SITES AND STRUCTURES

See also Appendices B and C

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5
Date prepared - 1988.

- ▲ NATIONAL HISTORIC SITE
 - △ " " " SITES
 - PROVINCIAL PLAQUE
 - " PLAQUES
 - "4" indicates number of sites/plaques in area
 - ⊘ INDUSTRIAL HERITAGE STRUCTURES
 - GRIST/FLOUR MILL
 - CANAL SYSTEM
 - INDIAN RESERVE
- DISTINCTIVE CONSTRUCTION MATERIAL:
- | | |
|---------------|--------------|
| B Brick | F Fieldstone |
| C Cobblestone | P Plaster |
| G Granite | |
| L Limestone | |

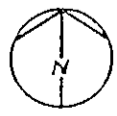
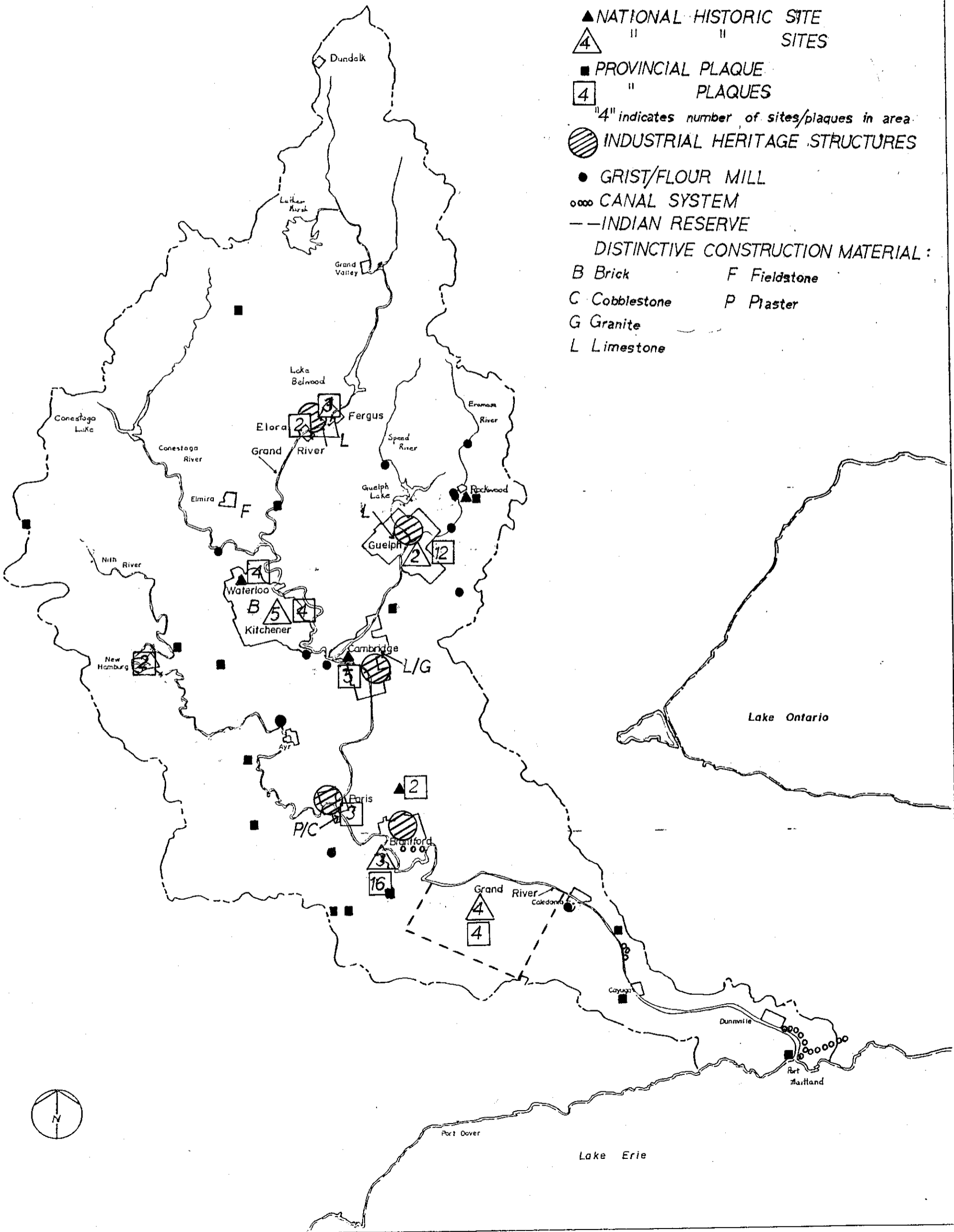


FIGURE 4

ETHNIC GROUPS, 1871

SOURCE: Census of Canada, 1871

See also Appendix D

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 7 12
Date prepared - 1988.

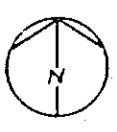
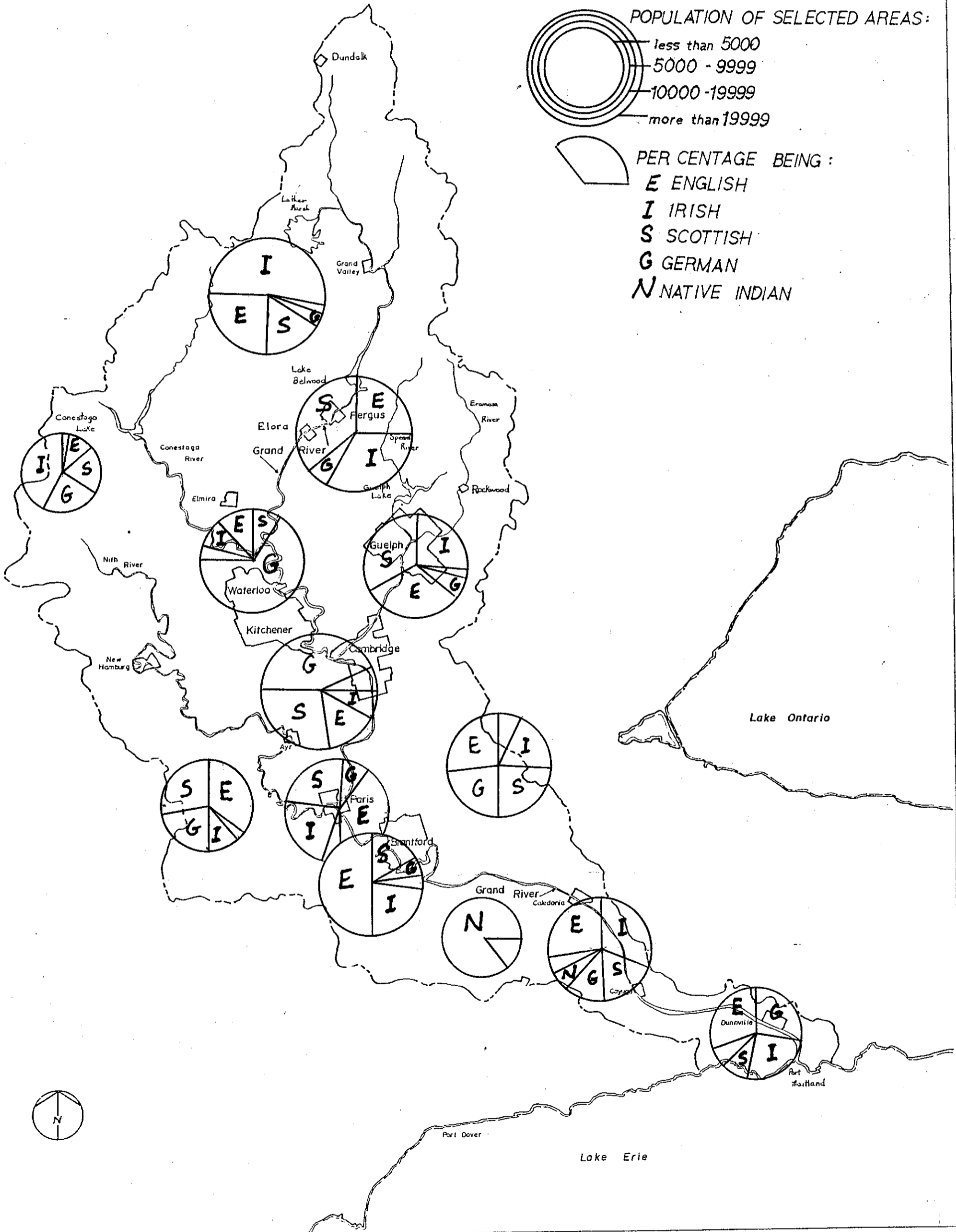
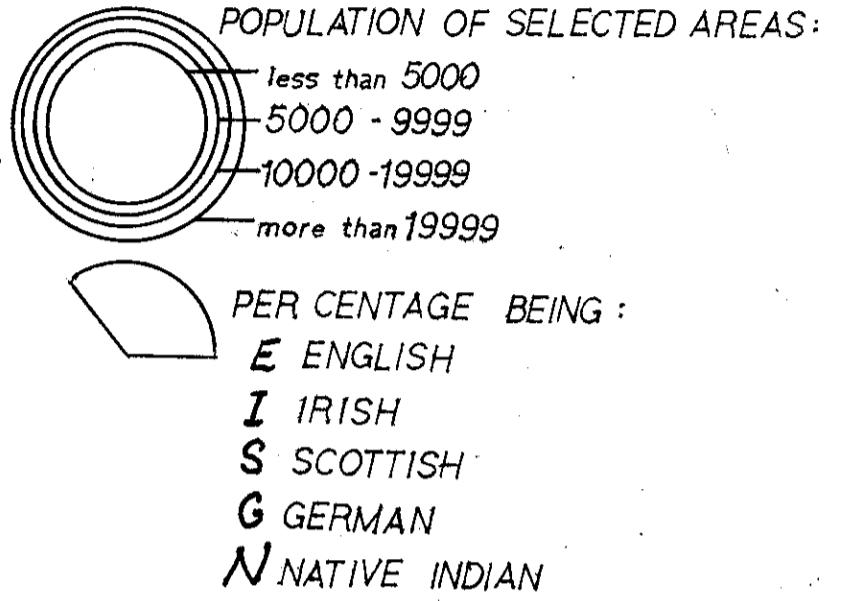


FIGURE 5

INDUSTRIAL POWER*, 1871

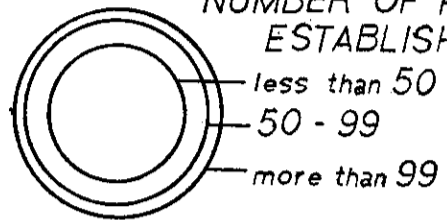
SOURCE: Bloomfield Databases, 1871 Manuscript Census

See also Appendix E

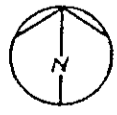
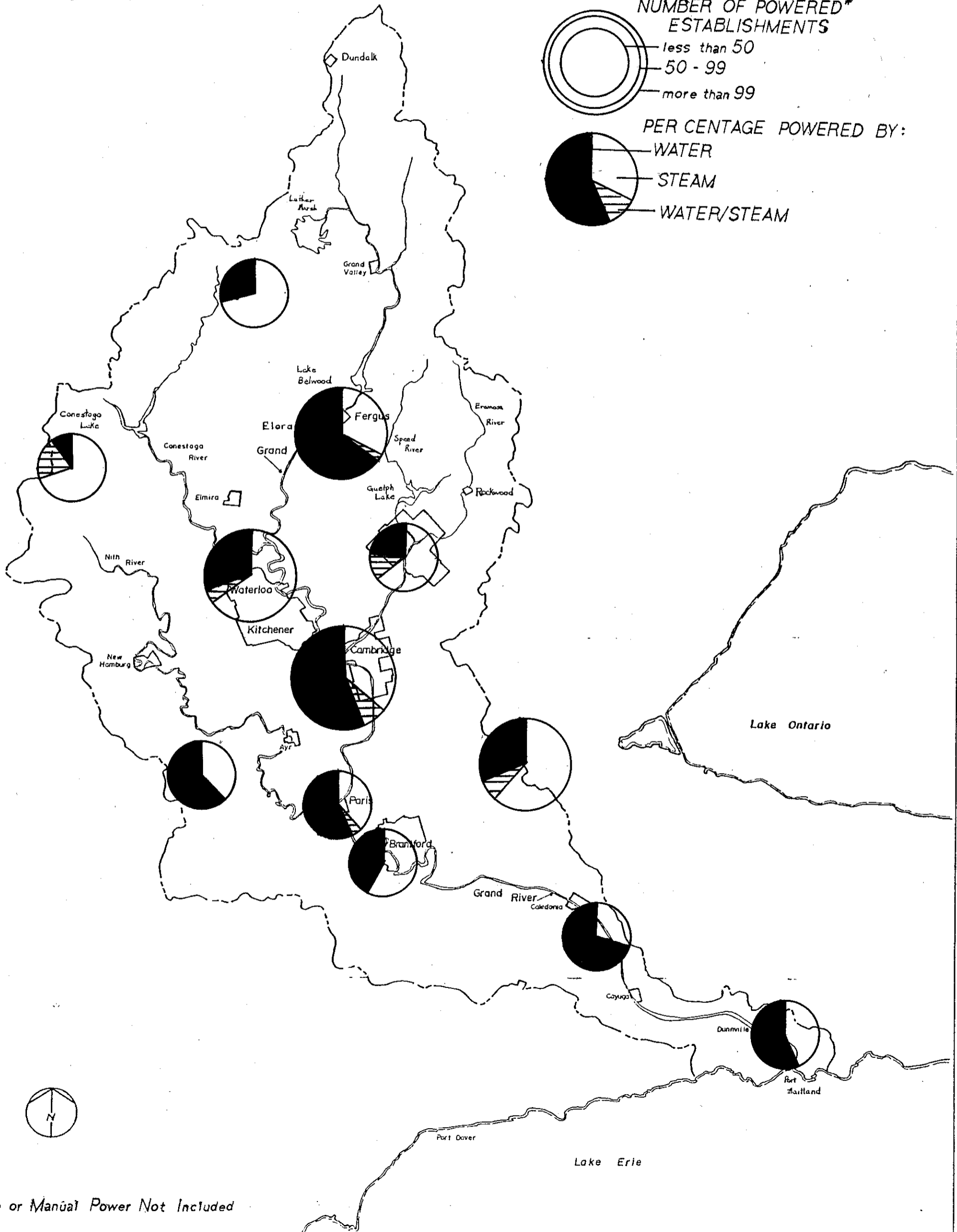
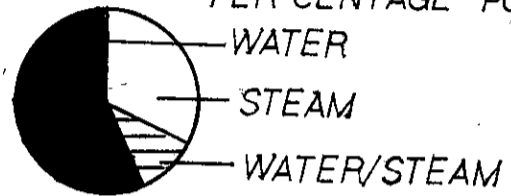
GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5 6
Date prepared - 1988.

NUMBER OF POWERED* ESTABLISHMENTS



PER CENTAGE POWERED BY:



*Horse or Manual Power Not Included

FIGURE 6

TRANSPORTATION DEVELOPMENT IN THE 19TH CENTURY

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5 6 7 8
Date prepared - 1988.

- ROADS
- ooooo CANALS AND RIVER NAVIGATION
- ① WELLAND FEEDER CANAL
- ② GRAND RIVER NAVIGATION CO.
- ▲▲▲ FIRST RAILROADS (1850s)

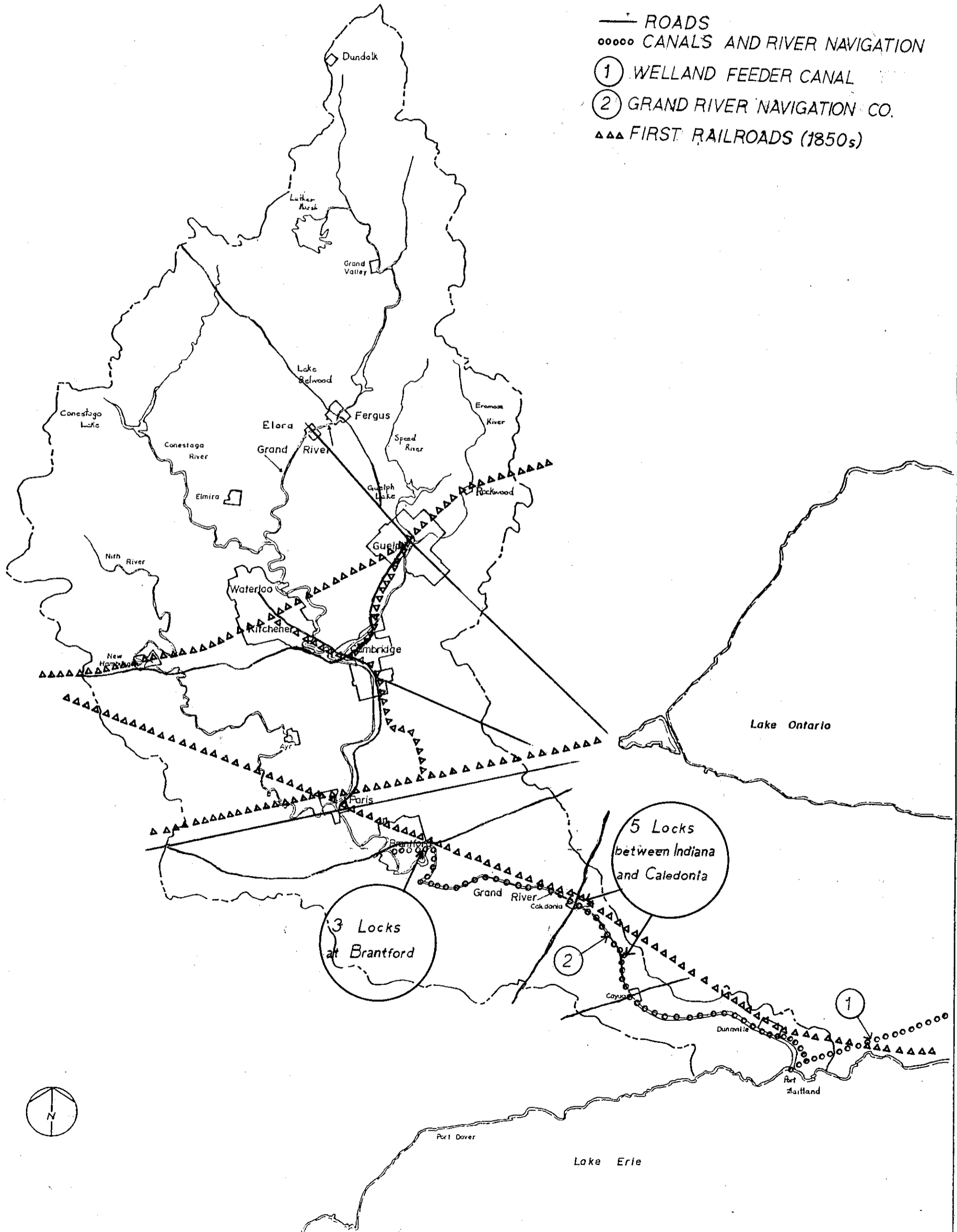


FIGURE 7




AREAS OF SIGNIFICANCE

See also Appendix F

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5

Date prepared - 1988.

-  PRIMARY
-  SECONDARY
-  TERTIARY

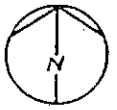
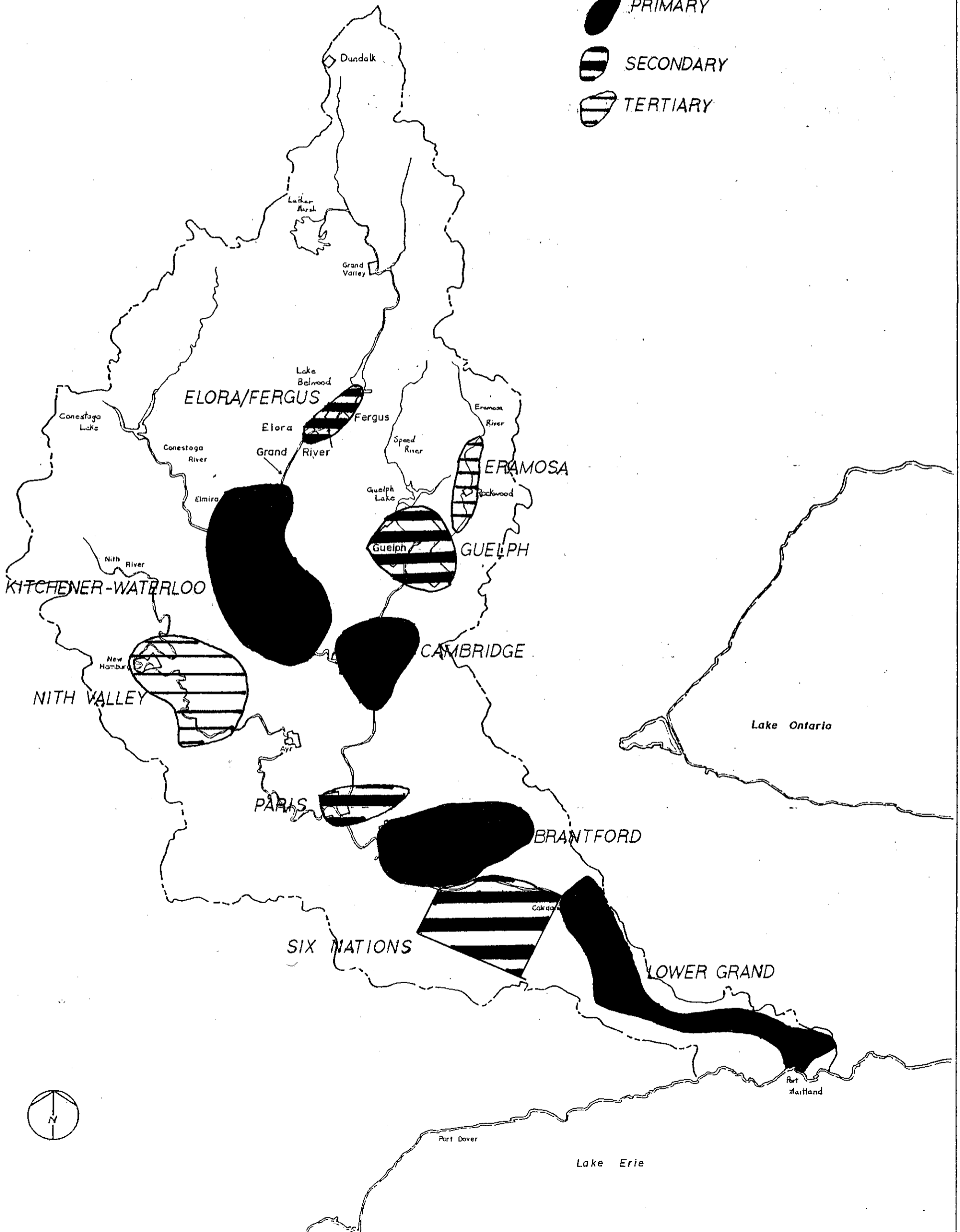


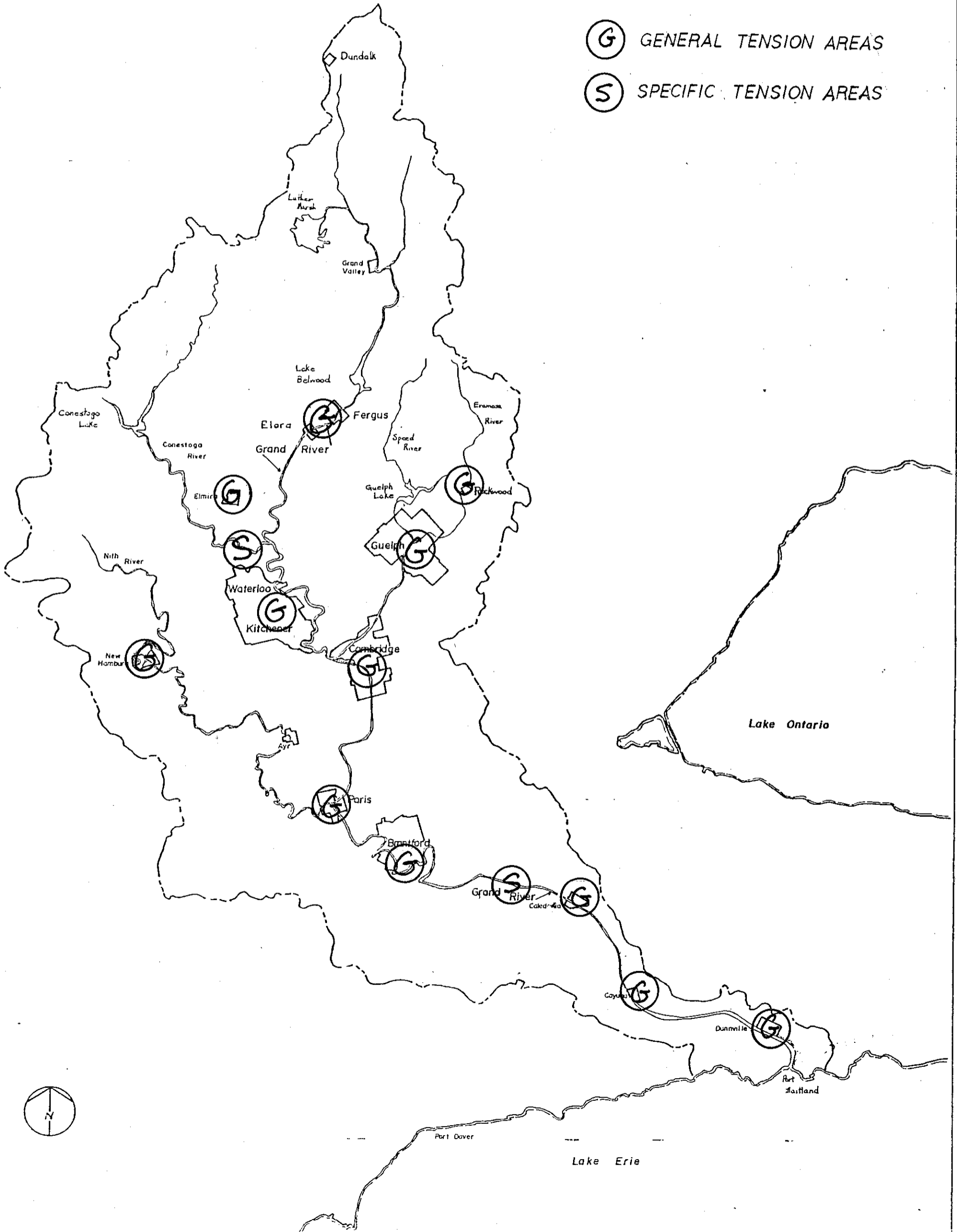
FIGURE 8

AREAS OF CONSTRAINT

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5 6
Date prepared - 1988.

- (G) GENERAL TENSION AREAS
- (S) SPECIFIC TENSION AREAS



References

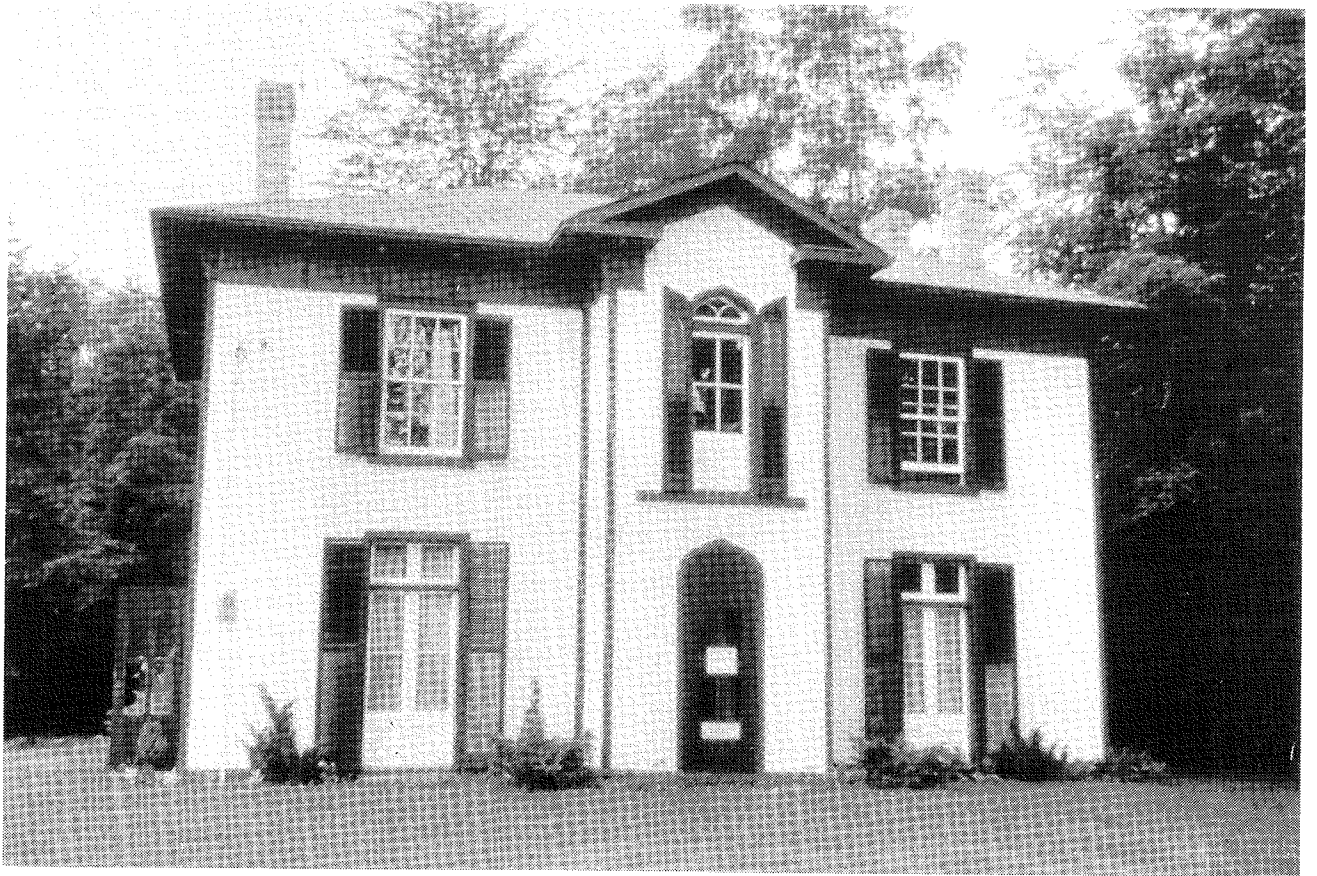
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Six Nations - Past and Present

Chris Hart and Mark Epp



CONTEXT

The major purpose of this report is to provide a historical perspective on the place of the Six Nations Indians in the Grand River Valley and to identify their significance in enriching the cultural mosaic of this area. As well, this report describes briefly the landholdings and position taken by Six Nations regarding access to the Grand River as it affects the Grand River Heritage Study and possible Canadian Heritage River status. Major sources of information used in achieving the goals of this study have been a range of interested parties who consented to be interviewed.

Since the deglaciation of the Great Lakes Peninsula native peoples ranged widely, as evidenced by settlement remains dated back to the Archaic (5000 - 1000 B.C.) and Palaeo-Indian periods (9000 - 5000 B.C.). At the time of European contact, the natives found in the lower reaches of the Grand River Valley were the Attiwandaronks, also referred to as Neutrals. A Récollet priest by the name of Father d'Aillon, travelling from the French mission in Huronia to Neutral territory in 1626, reported 28 Indian villages similar to those found in Huron Country (Johnston, 1964:4).

Archaeological research indicates that most of these villages were located immediately east of the Grand River, extending to the west end of Lake Ontario (Wright, 1981:1). These basically agrarian peoples were also known as traders. While they hunted they did not range far from their home territory. The Jesuit missionary of Fathers Brébeuf and Chaumont attempted to convert the Neutral tribes to Christianity in 1640, with a trip down the Grand River. They met with little success and no mission was established (Johnston, 1964:11-22).

In the mid-1600s, the Five-Nations Iroquois (the Onondaga, Cayuga, Seneca, Mohawk and Oneida), later to become Six Nations with the joining of the Tuscaroras in 1712, defeated the Huron Tribes southeast of Georgian Bay. Following this period, war was made against the Neutral Indians and they were driven from their homeland. The Iroquois desired only a dominance of hunting rights in the former Neutral territory. They did not wish to settle in this area, and it remained unpopulated for approximately 130 years after 1650. During this period, only trappers and nomadic Mississauga Indians from the Manitoulin District travelled through the Grand River Basin. By 1700, roving bands of Mississaugas were in greater predominance throughout Southern Ontario as they continued to migrate south. These hunters and gatherers were sparsely distributed and limited in numbers. Through a long period of occupancy during the 18th century the Mississaugas established their claim to the land of the Grand River Basin.

Following the American War of Independence, 1775 - 1783, a large influx of British entered what is now the Province of Ontario. Among these loyalists were a group of Six Nations Iroquois from the Mohawk Valley of Upper New York State, led by Joseph Brant. At this time the British Crown undertook to purchase land from the Mississauga Indians to be used as compensation for those loyalists who had lost their lands to the Americans. Within these lands purchased was a tract specifically obtained for settlement by the Six Nations and granted to them through a proclamation by Sir Frederick Haldimand, Governor of Quebec, (Upper Canada did not exist until 1791) on October 25, 1784. The terms of this land grant were as follows in Haldimand's proclamation:

"... whereas His Majesty having been pleased to direct that in consideration of the early attachment to His cause manifested by the Mohawk Indians and the loss of their settlement which they thereby sustained that a convenient tract of land under His protection should be chosen as a safe and comfortable retreat for them and others of the Six

Nations who have either lost their settlements within the territory of the American States or wish to retire from them to the British. I have at the earnest desire of many of these His Majesty's faithful allies purchased a tract of land from the Indians situated between the Lakes Ontario, Erie and Huron, and I do hereby in His Majesty's name authorize and permit the said Mohawk Nation and such others of the Six Nations Indians as wish to settle in that quarter to take possession of and settle upon the banks of the river commonly called Ouse or Grand River, running into Lake Erie, allotting to them for that purpose six miles deep from each side of the river, beginning at Lake Erie and extending in that proportion to the head of the said river, which them and their posterity are to enjoy forever." (Johnston, 1964:50-51).

Controversy since this time has revolved around the exact meaning of the terms agreed upon. Joseph Brant regarded the Six Nations as being independent of the British Crown and deserving of full nationhood recognition with rights of alienation entitling the Indians to sell or lease land as they saw fit. The authorities at this time, with little means to express their convictions, felt that the Indians should be seeking crown approval at all times before disposing of crown lands. Following surveys by Augustus Jones in 1791, the exact boundaries of the Haldimand grant were determined. However, they did not include the actual headwaters of the Grand as this portion had not been included in the 1784 purchase from the Mississaugas. The Indians accepted this situation at the time and made the best of it (Martin, 1979:13-21). Joseph Brant thought it necessary to facilitate the conversion of his people from a traditional native lifestyle to a more Europeanized agrarian one. In this regard, he actively sought European colonization of the Haldimand tract. As early as 1785, Brant had requested from the government that a church, school and mill be provided for the Mohawks. The Mohawk Chapel, dedicated in 1788, still remains as a historic site and significant reminder of the Mohawks' settlement at Brant's Ford, which later developed into the City of Brantford.

Brant was also eager to sell off land to white settlers and thus promote settlement as well as provide an income for the Indians. Brant proceeded to do this in the form of sales, 'Brant Leases', or outright grants. However the government, particularly under the administration of Sir John Graves Simcoe, held the opinion that Brant or the Six Nations did not have the right to alienate the land. In 1798, during the Russell administration, Brant's land transfers were officially recognized (Johnston, 1963:267-282). Accordingly, in 1798, the sale of six blocks of land were formally sanctioned, disposing of some 350,000 acres of the original 674,910 acres that made up the 1784 Haldimand grant (Johnston, 1964:iv). The greater part of these alienated lands, Blocks 1-4 (Figure 1), comprised the middle and upper portions of the Grand River Valley, approximately from Paris to Fergus, while Blocks 5 and 6 comprised most of present day Moulton and Canborough townships in Haldimand County (see Figure 1). While Brant's objective was to secure an income for the future of the Six Nations, in actuality the Six Nations did not in all cases receive the payments stipulated in the sales agreements (Martin, 1979:23-30). Besides these land sales, 999-year leases had been given out to a variety of individuals, many of them loyalists whom Brant had fought along with during the Revolutionary War. The Nelles, Youngs, and Dochstaders, for instance, were loyalists from the Mohawk Valley of New York State, who had also been civil servants of the Indian Department.

By the beginning of the 19th century and in the decades that followed, the Indians were confronted by a steadily increasing white encroachment. By the 1830s the exact situation with regard to land ownership, together with the problem of whites squatting upon Indian lands and the illegal cutting of timber, became the subject of a government inquiry. In 1841, the Government of Canada informed the Indians that a general

surrender of Indian lands to the crown administration would best serve the protection and interests of the Indians. This was done with the exception of 20,000 acres set aside as an Indian reserve. In 1843 the Six Nations petitioned for an increase in their lands, and in 1848 the present reserve lands comprising some 44,000 acres, primarily in Tuscarora and Oneida Townships, was agreed upon. A band of Mississauga Indians, formerly from the Credit River Valley, were also given a smaller tract of land (6,000) in 1847 which comprises the New Credit Reserve adjoining the Tuscarora Reserve near Hagersville.

As a people, the Six Nations came from a rich cultural tradition which was gradually undermined and overwhelmed by the expanding white European culture. Joseph Brant was by 18th century standards an acculturated Indian, having received a European education and having a great number of contacts with whites primarily through the British Indian Department. While Brant encouraged the transformation of his people into a settled agricultural society, others favoured the tradition of their ancestors.

Some of this dichotomy was apparent in those who adopted Christianity, as fostered by such missionary organizations as the New England Company and the Methodists. On the other hand, there were those who kept to older tribal traditions as carried on in the Long House religion, a cultural rebirth movement originating with the Seneca prophet, Handsome Lake, in western New York in 1799. The Mohawk Institute in Brantford, dating from 1828, remains as a legacy of the movement among white Christians to educate, convert and train Indians in order to facilitate their assimilation into a 'more advanced' Christian white culture.

The chapter on transportation history, mainly that of the Grand River Navigation Company, while comprising a significant part of the human heritage of the lower Grand Valley, makes a deep mark on the heritage and legacy of the Six Nations (Hill, 1971:31-40). Chartered in 1832, the Grand River Navigation Company was another example of 'canal fever' characteristic of the period but was unique in that it was primarily financed by Six Nations funds, unbeknownst to the Indians themselves (Hill, 1971:31-40). During the financially troubled tenure of the company the Six Nations received no dividends from their substantial investment, and when the company declared bankruptcy in 1861 the Six Nations sustained the greatest loss of all shareholders. Many early conflicts revolving around land transfers have fostered an atmosphere of regret that remains today among members of Six Nations.

PATTERNS

Current land holdings of the Six Nations include the Tuscarora Reserve (Indian Reserve #40) which, at approximately 44,000 acres, comprises Tuscarora Township and a small portion of Onondaga and Oneida Township to the east of the Grand River. The New Credit Indian Reserve #40A is contained within the larger Six Nations Reserve. The Six Nations Reserve extends into the northern edge of Haldimand Town Municipality at its southern boundary. There are also crown lands owned by Six Nations within the City of Brantford. The tract of land known as the Glebe Farm comprises 96 acres immediately adjacent to Mohawk Lake (City of Brantford, personal communication). South of here is the Eagles Nest Tract of 233 acres; this is the site of the original Mohawk Village where the Royal Chapel now stands (City of Brantford, personal communication). This latter tract extends south from the village site to the north bank of the Grand River (Figure 2).

The Tuscarora Reserve is surveyed into a grid pattern of concessions. Individual lots are severed throughout the reserve and private ownership of land prevails today. Ohsweken is the principal settlement of the Tuscarora Reserve while twelve smaller

crossroad settlements are acknowledged currently. Residences and businesses are largely located along roadways with the interior of concession blocks left in their natural vegetated state.

The New Credit Reserve is populated in a similar manner with the Village of New Credit at the centre.

SIGNIFICANCE

The Tuscarora and New Credit Reserves comprise the largest Indian reserve in southern Ontario. They are one of the more progressive reserves with modern facilities, amenities and services provided to the general populace. Band administration is carried out with the most up-to-date of facilities and methodologies as would be found in most small urban centres. Simply, their position within the Grand River Basin provides enrichment to the general cultural mosaic. On a provincial and national scale the Six Nations, largely through Joseph Brant's actions, played a major role in the settlement of Upper Canada, leading to important settlement patterns and characteristics found today.

Among present heritage resources related to Indian heritage are Brant's Ford (the original ford at the Lorne Bridge in Brantford); the Mohawk Chapel which was the first Protestant church built in Ontario and has the status of a Royal Chapel; the Mohawk Institute and Woodland Indian Cultural Centre; and the site of the Mohawk Village in Brantford. At Middleport there is Chiefswood, the birthplace of E. Pauline Johnson (1861 - 1913), a well-known Canadian poetess of Mohawk and English parentage. Significant persons such as Chief Joseph Brant, his son Captain John Brant, and the marathon runner Tom Longboat, are also commemorated with historical plaques. The Methodist Mission to the Six Nations is also commemorated with a plaque at Salt Springs near the reserve (Chanasyk, 1970:1-10) (Figure 2).

Clearly the Six Nations are of national significance, since they were part of that contingent of immigrants called Loyalists who first settled in Ontario in the 1780s. They are regionally and provincially significant, having dominated the patterns and politics of settlement in this region of Ontario at its very early stages, commencing with the Haldimand Grant of 1784. Their significance lies also in the fact that they represent a different cultural tradition that in the course of time has both accepted and resisted assimilation with the surrounding European settlement groups. In the past few decades, many Indians have made great strides in recognizing again their cultural heritage. It should be in common recognition of this cultural heritage along with Six Nations claims that the heritage resources of these people be preserved and developed as part of the natural and cultural heritage of the Grand River Valley.

The report dealing with biological resources of the Grand River Valley provides greater detail concerning significant natural resources of the Six Nations Reserve and should be consulted. However, the reader should note that the entire reserve has been designated as highly significant for its tracts of forest under the auspices of the Carolinian Canada project.

CONSTRAINTS

Urban encroachment on Indian-owned lands within the City of Brantford may be considered a constraint. However, the City of Brantford maintains that development priorities for the Mohawk Lake area are for restoration, interpretation and enhancement

for recreation (City of Brantford, personal communication). If the Six Nations Band Council concurs with municipal planners this situation will not develop into an issue.

At this time there do not appear to be constraints related to lands of the Six Nations Reserve. The Steering Committee for the Lower Grand, an intermunicipal group comprised of representatives from Brantford and Haldimand-Norfolk, has been promoting recreational boating on the Grand. This Committee wants to open the Grand to navigation from Lake Erie to Brantford through refurbishing of the abandoned Grand River Canal and construction of new locks where necessary. This project, should it go ahead, could lead to constraints on the current and traditional native lifestyle. Six Nations Council has expressed concern over potential conflicts arising between native fishing access near to the reserve and increased use of the Grand River for power boating. Council has clearly stated that they are not prepared to accept any development or legislation that will affect fishing near to the reserve; an expressed concern is disturbance by boats of 'major spawning grounds' (Phil Monture, Six Nations, personal communication).

MANAGEMENT ISSUES

The greatest concern to management at this time concerns the Six Nations claim to the bed of the Grand River. The position they have taken may well lead to a situation in which they control access along the river. Any management considerations of a Canadian Heritage River status for the Grand should take into account this and other Indian claims outstanding within the valley.

The Band Council of the Six Nations maintains that the English Common Law principle of *ad medium filum aquae*, which granted to the owner of land adjacent to a non-tidal waterway the ownership of the waterway bed, was in effect and thus applicable at the time of the original Haldimand Deed. Since this principle preceded the Simcoe Patent of January 14, 1793, precedence should hold that the Six Nations Indians received in their land grants of the Haldimand Deed and the Simcoe Patent the area defined as the 'bed of the Grand River' (Six Nations Council, 1988).

A Federal Government ruling of February 26, 1982, supported the Six Nations position and maintained that Indian ownership of the bed of the Grand River was not affected subsequently by the Beds of the Navigable Waters Act (Province of Ontario, 1911). The tow path to either side of the Grand River, for a distance of one chain, was reserved for Six Nations through an Act of Legislation by the Legislature of Upper Canada in 1832 when the Grand River Navigation Company was set up under 2nd WMIV Ch. XIII. Since this time, the tow path has been acknowledged as a reserve for Six Nations as recently as February 21, 1988 (Six Nations Council, 1988).

For these reasons the Band Council of the Tuscarora Reserve takes the position that:

"The Six Nations Indians contend that under the English Common Law Principle of *ad medium filum aquae*, the Six Nations Indians of the Grand River own the bed of the Grand River and the tow paths remain in our domain of legislation reserving the same.

Furthermore, the tow path along each side of the Grand River and the bed of the Grand River itself are the properties of Six Nations; application of the Beds of Navigable Waters Act is *ultra vires* and not applicable as would be other Provincial legislation. Any easements, permits or permission to

designate the Grand River as a Heritage River are legally subject to the consent of the Six Nations Indians." (Six Nations Council, 1988)

The Crown (Province of Ontario) maintains for its own part that, "The ownership of the bed of the Grand River, as with all navigable rivers and lakes within the territory ceded by the King of France to the King of England by the Treaty of Paris, 1763, was vested in the British Crown". The Executive of the Provinces of Upper Canada and of Canada prior to Confederation had the common law right to exercise and administer the Crown's proprietary right over the beds of navigable rivers and lakes, which was legislatively confirmed by An Act Respecting the Sale and Management of the Public Lands in 1860. Section 109 of the British North America Act, 1867, provided that:

"All Lands, Mines, Minerals and Royalties belonging to the several Provinces of Canada, Nova Scotia, and New Brunswick at the Union ... shall belong to the several Provinces of Ontario, Quebec, Nova Scotia and New Brunswick in which the same are situated, subject to any Trusts existing in respect thereof, and to any Interest other than that of the Province in the same; and thus transferred legislative and administrative jurisdiction to the beds of waterways within the geographic boundaries of Ontario to the Province of Ontario and the ownership of those beds remained in the Crown in right of the Province of Ontario. Historically the bed of the Grand River has been continuously administered by Ontario from 1867 to the present as Crown land in right of the Province." (Bourgeois, 1986).

Thus it is seen that despite the position of the Six Nations Band Council regarding their claim, the bed of the Grand River has been administered as Crown land by the Government of Upper Canada, and the Province of Canada prior to Confederation, and has been administered from 1867 to the present by the Government of Ontario.

It is not the intent of this author to take a position but, rather, to note the conflict between the Six Nations Band Council and the Crown for the Province of Ontario as an important issue for heritage planning and management for the Grand River.

COMMENTS

Concern has also been expressed that any archaeological sites should be preserved and remain unknown to the general public. This concern has been voiced in a number of quarters and should be addressed directly by limited distribution of relevant information.

FIGURE 1
THE SIX NATIONS INDIAN RESERVE
ADJACENT TO THE GRAND RIVER
1784 TO 1850

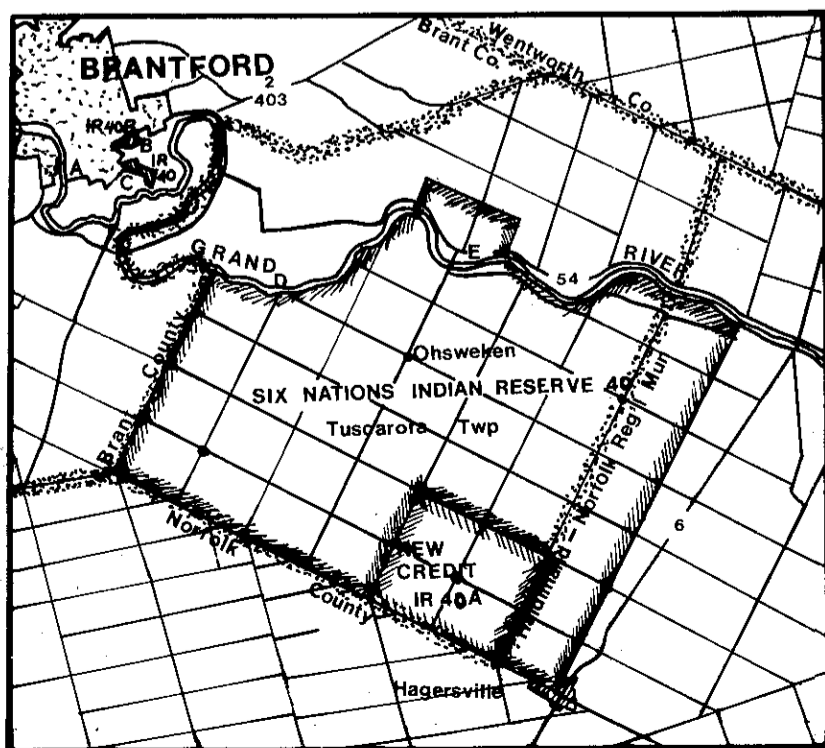
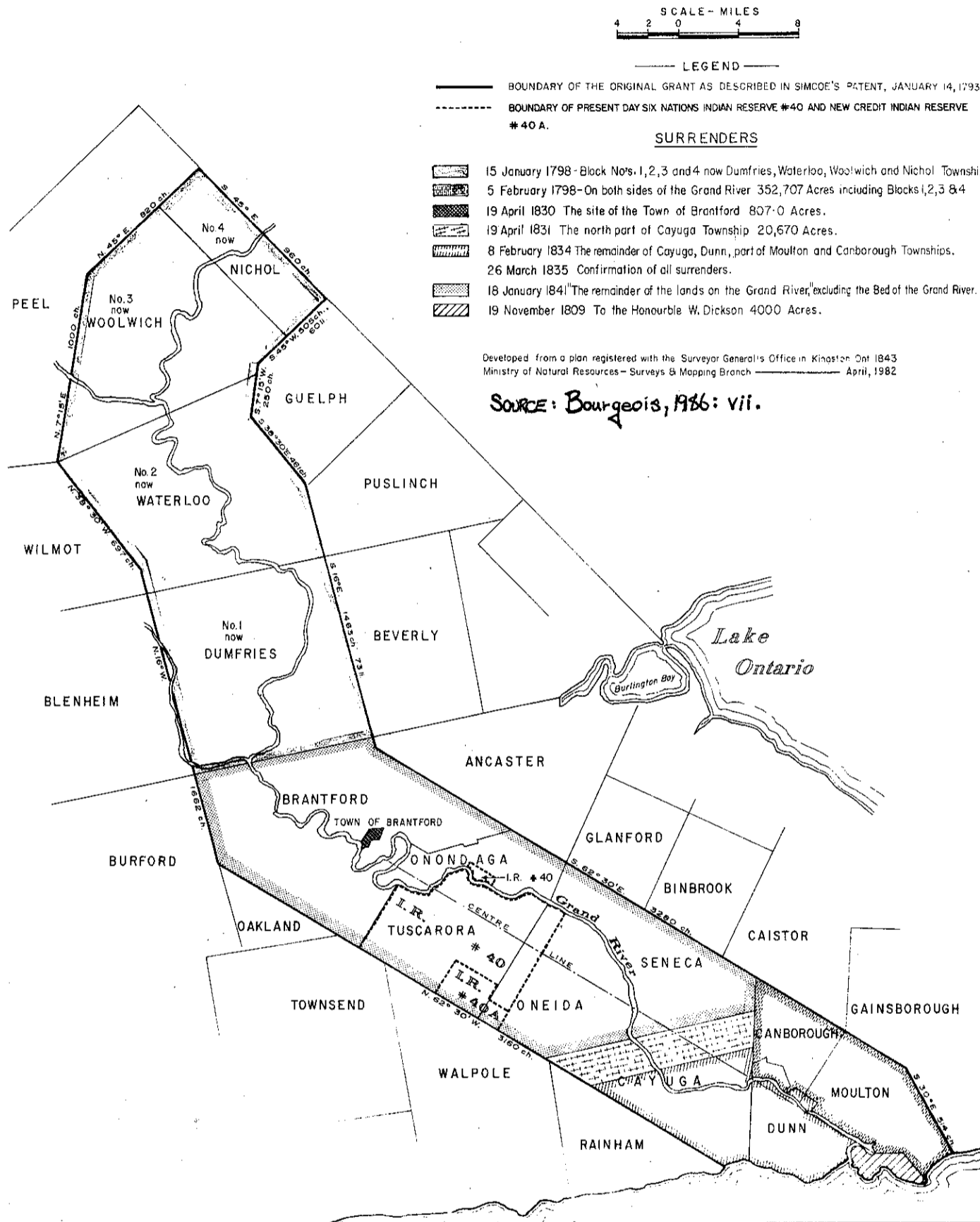


FIGURE 2
SIX NATIONS LANDS
IN THE VICINITY
OF BRANTFORD

COUNTY BOUNDARIES
 SIX NATIONS BOUNDARY
 NEW CREDIT BOUNDARY

HERITAGE SITES:

- A - Brant's Ford
- B - Glebe Farm
- C - Eagles Nest Tract
- D - Salt Springs Mission
- E - Chiefswood

MILES
 0 1 2 3 4 5

SOURCE: N.T.S.

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Recreation in the Grand River Valley

Pauline O'Neill



CONTEXT

The purpose of this section of the Grand River Heritage Study report is to describe and map recreation opportunities associated with the Grand River, and to assess and map areas of significance and constraints with respect to recreational values. In terms of this study, there is special interest in significance for Canadian Heritage River status.

A wide variety of types of water bodies, both natural and man-made, are used for recreation; and an equally great range of activities take place in association with these water bodies. Some, such as swimming and water skiing, involve direct contact with the water; others, such as boating and sailing, take place on the water; scuba diving takes place under the water; the patronage of spas may involve drinking the water. Many recreational activities do not require the presence of water for participation to occur but their enjoyment may be enhanced by the presence of water. Sunbathing often takes place adjacent to a water body, and camping and hiking experiences are generally enhanced by the proximity of shorelines. The summer cottage, beloved of many Canadians, is not quite the same if it does not have water access. However, water-based recreation will be poorly understood if attention is focussed solely upon the water. Man is not an aquatic animal and recreational activities involving water, probably without exception, are based firmly on the land. Most water-oriented recreation takes place at the water's edge, and it is at the land-water interface that most of the impacts occur and the majority of artifacts associated with water-based recreation are to be found (Wall, 1982:239).

The first boom in recreation and tourism in Ontario came with the economic boom that started in 1896, but in a sense it was a restricted boom, because only the well-to-do participated; this was the era of the society resort (Wolfe, 1982:134). The majority of resorts developed in response to demand for water-based recreation. The links between recreation and health were most evident in the popularity of spas at this time; Preston, now part of Cambridge, was famous for its spas around the turn of the century. Although Preston no longer functions as a spa, two of the former spa hotels still form a striking feature in the urban landscape (Wall, 1982:242).

The character of recreational land use in the Ontario of the 1920s, during the second tourist boom, was radically different from that at the beginning of the century. In the 1920s working class resorts began to develop around major accessible lakes; Port Maitland, on Lake Erie at the mouth of the Grand River, is an example of this type of development. Great numbers of working class people owned cars and, if the number of cottage owners among them was much smaller, still they could afford to buy tents and go camping. Here was foreshadowed the most striking change that recent years have brought to the pattern of outdoor recreation in Ontario: the vast increase in the number of campers and of parks needed to accommodate them (Wolfe, 1982:134-136).

Since World War II both non-mechanized and mechanized recreational water travel use of southern Ontario waterways has grown rapidly. Improvement in aesthetic and sanitary quality of many waterways following such measures as abandonment of mills and installation of sewage treatment facilities, and growth in public recreation facilities along waterways and increasing demand for near-urban outdoor recreation, have been major factors favouring increasing use of southern waterways (Ontario Ministry of Natural Resources, 1978:Wa-1-2).

The recreational development of waterways which has taken place in southern Ontario has been spearheaded by Conservation Authorities. Originally established in the 1940s and 1950s for watershed resource conservation and flood control purposes, Conservation Authorities have since the 1950s become important recreational agencies

as well, providing through the establishment of conservation areas many new opportunities for recreational travel on and use of waterways (Ontario Ministry of Natural Resources, 1980:2).

Growth in motorboat ownership and use and, more recently, in canoe, kayak and sailboat ownership and use, has been rapid in the post-war period. While the rates of increase in use of the wildest rivers of northern Ontario have been high, the total numbers using these remote rivers remain small. The pressure is greatest in southern Ontario where the large majority of the province's people live. Most southern Ontarians who wish to partake in recreational water travel want to do so within a weekend trip range (for most people, no more than a three-hour drive each way). It is on southern Ontario's waterways that the demands in absolute numbers are greatest. These demands appear to be continually increasing more rapidly than the population (Ibid.).

Much of the data on recreational activities and facilities in the Grand River valley presented in this report was obtained from the Grand River Conservation Authority, and in particular from Existing and Future Land Use Activities Within the Grand River Basin, Technical Report No. 8 of the Grand River Basin Water Management Study (Veale, 1981). The summary data presented in the GRCA report were based on the Ontario Recreation Supply Inventory, which was completed by the Ontario Ministry of Tourism and Recreation in 1978. This comprehensive data base is an inventory of recreation sites with an indication of the types of facilities and activities at each. These may include picnic areas; beach areas; camping areas; boat docking, launching, haulout and rentals; trails; commercial accommodation; hunting and fishing; fairgrounds; natural science exhibits; summer camps; golf courses; and historic sites. In preparing their 1981 report, the GRCA selected from the Ontario Recreation Supply Inventory data those recreational facilities in the Grand River basin which they considered to be water-based, i.e. adjacent to water bodies. Unfortunately, funding for the Ontario Recreation Supply Inventory project was discontinued. Some limited updating was done to 1981, but nothing further has been added since then. Consequently the 1978 data are the most recent available from secondary sources.

TOURISM

Tourism is an important economic activity in the Grand River valley, and appears to have growth potential for the future. As the economic importance of tourism is better recognized in Canada generally, so awareness is growing in this area also.

At the provincial level, resources in the Grand River valley are marketed as part of the "Festival Country" theme of the Niagara and Mid-Western Ontario Travel Association based in Brantford; this information is published in the Traveller's Encyclopaedia produced by the Ontario Ministry of Tourism and Recreation.

At the regional level, the GRCA is currently undertaking a Grand River Corridor Study. The study area extends lengthwise along the Grand River within the Region of Waterloo, and will generally include the river, the banks, and other lands up to and including the closest roadway on either side of the river. The overall purpose of the study is to identify and guide property acquisition, development and redevelopment of open space along the Grand River. This includes a review of the range of current and potential activities in the study area, including recreation, which are dependent on the available resources; and identification of economic and tourism opportunities.

In the past there has been very little co-ordination among municipalities in terms of a tourism promotion strategy. This situation has resulted in a number of unfulfilled area tourism opportunities such as event and tour co-ordination, tourism information, co-operative program development, industry/market research, and market image development (Pannell Kerr Forster, 1985:2). There are many brochures, pamphlets and other promotional materials printed by individual agencies and/or businesses describing particular facilities, but their distribution seems to be limited. The larger municipalities have Chambers of Commerce and/or Visitor and Convention Bureaus. However, local mandates, limited budgets and staff time constraints have not permitted maximization of tourism potential. There is a recognized need for area-wide tourism initiatives, but a lack of the financial and human resources needed to carry them out. In spite of this, in January 1986 the cities of Cambridge, Kitchener, Stratford and Waterloo, and the townships of North Dumfries, Wellesley, Wilmot and Woolwich formed the Inter-Municipal Tourism Committee to enhance the scale and scope of tourism activities and the associated benefits that occur from them. The purpose of the committee is to market the area as a tourism destination and, in co-operation with the business community, to facilitate improvement and expansion of tourism sites, attractions and services. Since 1986 a variety of projects and initiatives have been undertaken, ranging from educational programs to brochure and literature development and distribution. The latest of these is the introduction of a "Heartland Ontario" promotional theme and tourism map highlighting recreation resources in the central part of the valley.

In the lower valley, the Department of Economic Development of the Regional Municipality of Haldimand-Norfolk and the Ontario Ministry of Tourism and Recreation funded a recently completed tourism strategy study to identify potential for increasing the level of tourism activity and expenditures in Haldimand-Norfolk (Economic Planning Group of Canada, 1988). Existing tourism in the region is based primarily on the resources and activities provided by Lake Erie, and to a lesser degree by the Grand River.

PATTERNS

Water-Based Activities

Water-based activities considered in this section and shown on Map 1 include: canoeing and kayaking, sailing and windsurfing, power boating and water skiing, swimming, fishing, and scuba diving.

Canoeing on the Grand River is such a popular activity that the Grand River Conservation Authority has published a canoeists' guide with detailed maps for each section of the river giving access points, dams and bridges, picnicking and camping areas, points of interest, etc. (GRCA, 1982). It is possible to canoe the Grand from Belwood to Port Maitland on Lake Erie, although above Cambridge low water levels in late summer can necessitate walking and dragging the canoe for short stretches. Canoeing above Elora is very limited; other than Belwood Lake, the water levels are too low except in early spring. The section of the river from Cambridge to Paris is probably the most popular for day trips. However, no surveys have been done to give an indication of the level of use. Canoeing is also popular on the conservation area reservoirs, particularly the ones where no motorized boating is allowed. Kayaking appears to be limited; use is mainly by clubs who run Elora Gorge in early spring.

Sailing and windsurfing are popular on all the reservoirs -- Belwood, Conestogo, Guelph, Laurel Creek, Shade's Mills and Pinehurst Lake. The Grand River below Brantford is wide enough to accommodate these activities, but use is limited because of the number of power boats.

Power boats are allowed on the reservoirs at Belwood and Conestogo, and water skiing is popular in both these locations. The Grand River is navigable for power boats 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.

People may swim in the Grand River and its tributaries wherever there is convenient access to the shore. Mapping this type of unorganized activity is not feasible, and only designated swimming areas have been taken into consideration. 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 private/commercial parks which provide swimming opportunities.

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. In general, the diversity of fish species increases from the upper to the lower river. Other species found in the Grand include smallmouth bass, largemouth bass, black crappie, pike, walleye and salmon. The GRCA stocks a limited number of rainbow trout at Conestogo below the dam, Rockwood Lake, and two fish ponds at Belwood and Elora. This is a put-and-take fishery, but some trout do survive angling pressure and grow quite well, especially in the waters below Conestogo Dam.

The Grand River itself does not provide any opportunities for scuba diving, but some activity occurs at Elora Quarry and Pinehurst Lake. Use is primarily by clubs and police for training purposes. The GRCA allows diving by permit only, which must be obtained in advance.

LAND-BASED ACTIVITIES

Land-based activities considered in this section and shown on Map 2 include: picnicking and sunbathing, camping, outdoor education and naturalists activities, hunting, cross-country skiing and snowmobiling, viewing human heritage (historic structures, museums and exhibits), and events and festivals. Hiking trails are reviewed separately in the following section.

Municipal, regional and provincial governments as well as the private sector have all established picnic areas and campgrounds in the Grand River valley. These were listed in detail in the 1978 Ontario Recreation Supply Inventory data. As in the case of swimming opportunities, activity outside designated areas has not been mapped.

The Grand River Conservation Authority operates four Nature/Interpretive Centres in the Grand River valley. The primary users of these facilities are the seven watershed school boards and their students, who participate in formal outdoor education programming. Community groups can also book the Nature Centres for programs involving both indoor films and speakers, as well as outdoor hikes and guided walks. On Sundays a series of "Conservation for Communities" programs are offered for the

general public. Statistics on program attendance and visitation are published in the GRCA Annual Reports, but no source statistics are compiled.

There are a number of naturalists clubs in the valley which 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 Galt and Paris, and the marshes around Dunnville and in Byng Island Conservation Area. Along the Speed River Guelph Lake, Guelph Arboretum and Kortright Waterfowl Park are important areas.

Hunting is permitted in designated zones at two conservation areas: Luther Marsh and Conestogo Lake. Waterfowl are the main attraction at Luther Marsh, although small game and deer may be hunted in season. At Conestogo Lake permits may be purchased to hunt pheasants, which are stocked; hunting of waterfowl, small game and deer is also permitted in season. However, these two areas provide only a small part of the total hunting opportunities in the Grand River valley; hunting preserves managed by the Ontario Ministry of Natural Resources provide many more opportunities, for example near Salem, Roseville, and Dunnville. Many of the natural areas along the river throughout its length provide habitat for waterfowl, small game, and deer.

The GRCA maintains groomed cross-country skiing trails at Elora Gorge, Laurel Creek, Pinehurst, and Shade's Mills. Many other conservation areas and public lands are used on an unofficial basis. Snowmobiling is permitted on trails in designated areas at Belwood, Conestogo, and Luther Marsh. Again, unorganized activity has not been mapped.

Viewing human heritage depends upon the presence of historical artifacts, which have been described in an earlier section of this report. Consequently this activity has been mapped only in a general way, in locations where there are clusters of historical features. In this context it is worth noting that walking tours of urban areas are becoming increasingly popular, the purpose of which is viewing human heritage. Both Waterloo and Cambridge have produced brochures suggesting routes and describing outstanding features.

Many municipalities in the Grand River basin 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.

A map of scenic drives and points of interest has been developed for the Region of Waterloo and is distributed by the local Chamber of Commerce. Nothing comparable exists for the lower river.

TOURISM

There is very little quantitative information on tourism activity in the Grand River valley. Statistics collected by federal and provincial agencies are for the most part aggregate data on travel patterns in southwestern Ontario and average expenditures of visitors, which are not attributable to particular resources or attractions. The GRCA compiles summary statistics on visitation to the conservation areas, but these are not broken down by source. Studies were completed in 1986 by the Ontario Ministry of Tourism and Recreation, Southwest Region, on the economic impact of tourism in Kitchener,

Cambridge and Guelph, the main objective of which was to measure expenditures rather than to describe patterns of activity. It is worth noting, however, that according to these 1986 studies pleasure travellers (as opposed to business travellers) accounted for 42.9% of the total accommodations rented in Kitchener, 57.3% in Cambridge, and 26.3% in Guelph. Room revenue generated by pleasure travellers totalled \$5 million, \$2.5 million and \$1.2 million respectively (Ontario Ministry of Tourism and Recreation, 1986a, 1986b, 1986c).

SIGNIFICANCE FOR RECREATION

One way of describing and evaluating recreation opportunities is the Recreation Opportunity Spectrum (ROS). Recreation opportunities are expressed in terms of three principal components: the activities, the setting, and the experience. Possible mixes or combinations of activities, settings, and probable experience opportunities have been arranged along a spectrum or continuum, which is divided into six classes: (1) primitive, (2) semi-primitive non-motorized, (3) semi-primitive motorized, (4) roaded natural, (5) rural, and (6) urban (Clark and Stankey, 1979). No value judgments are attached to these classes; a wilderness opportunity is not inherently more or less desirable than an urban opportunity. The Grand River valley provides some roaded natural recreation opportunities, with the majority being rural and urban.

In the publication *Tourism Tomorrow*, a review of tourism products from an international perspective identified eight major categories into which Canada's tourism regions could be classified: wilderness/expedition, sporting/adventure, leisure/recreation, beach/recreation, heritage/culture, urban, resort, and scenic. Each region of Canada was classified according to its predominant pleasure tourism characteristics. The south/southwestern Ontario region was characterized by heritage/culture themes and leisure/recreation, the latter defined as numerous small scale recreational and cultural products easily accessed by local populations and suitable for day trips (Tourism Canada, 1985:12-20).

The Ontario Ministry of Natural Resources designed an original evaluation methodology to evaluate the suitability of Ontario waterways for Waterway Park designation (Ontario Ministry of Natural Resources, 1980). The scheme involved scoring of six areas of concern on a priority basis for a total score out of 100 as follows: recreation evaluation 35%, historical resources 20%, natural features 20%, endangerment 10%, potential to meet supply deficiencies 5%, and complementary features 10%. The priority weighting given to the recreation evaluation was based on the results of an evaluation scheme intended to consider variables which are known to be important to the recreational water traveller. These variables, each of which was given equal weight, are as follows: (1) Variables for low intensity recreation potential: length, navigability, diversity of conditions for watercraft, accessibility, campsite and landing availability, carrying capacity, water quality, impoundments, and conflicting activities (road, rail, utility, settlement, urban-industrial-extractive). (2) Variables for high intensity recreation potential: navigability, diversity of conditions for watercraft, accessibility, campsite and landing availability, carrying capacity, and water quality.

A total of 193 waterways or waterway segments were evaluated. All of Ontario's most outstanding waterways were examined, including some already in provincial and national parks. The results of the evaluation for the Grand River, which was divided

into three segments, are as follows:

Belwood to Cambridge (Galt):	Recreation score: 21/35 Total score: 74/100 Rank: 38/193
Cambridge (Galt) to Caledonia:	Recreation score: 14/35 Total score: 69/100 Rank: 64/193
Caledonia to Port Maitland:	Recreation score: 14/35 Total score: 67/100 Rank: 70/193

In general, scores of 70 - 100 were interpreted to indicate waterways of high priority for further study for Waterway Park purposes; scores of 50 - 69 indicated waterways of secondary priority; and scores below 50 indicated waterways lacking any priority for further study.

A consultant's study completed for the Ontario Ministry of Natural Resources in 1987 assessed the rivers in Ontario to determine priorities for nomination to the Canadian Heritage Rivers System according to the CHRS selection guidelines (Cathexis Associates, 1987). The way in which those guidelines were operationalized drew heavily on the evaluation scheme developed by OMNR for Waterway Park purposes and summarized above. The Grand River was ranked 8th out of 11 recommended heritage rivers in Ontario, based on outstanding human and natural heritage values but not on recreational values.

In case studies completed to date using the ABC method, significance for recreation has been one of the criteria used to evaluate cultural significance. However no further criteria have been developed within this category to define recreational significance. In the case of the Grand River, where there are so many recreation opportunities, a more detailed breakdown is needed. The following criteria are a first attempt at this.

(1) Natural Activity Diversity:

This refers to the number of recreation activity opportunities within an area which depend upon the natural resource base. These opportunities comprise water-based activities, including canoeing and kayaking, sailing and windsurfing, power boating and water skiing, swimming, fishing, and scuba diving; and land-based activities, including picnicking and sunbathing, camping, naturalists activities and outdoor education, hunting, and cross-country skiing and snowmobiling. It should be noted that these activities have been recorded where they occur in designated areas only. It has not been possible to include consideration of unorganized activities. Further, limited resources and the scale at which the mapping is being done preclude a detailed inventory of all the specific recreational facilities and activity opportunities which exist within the Grand River valley.

(2) Human Activity Diversity:

This refers to the number of recreation activity opportunities within an area which depend upon the man-made or built environment. These include viewing historic structures, museums and exhibits, events and festivals, shopping (especially for arts, crafts, special items), and restaurants. Certainly shopping and restaurants are in most cases not directly related to heritage values. Notable exceptions are the old mills in several communities along the river which have been converted into restaurants with the original structure preserved. However these have been taken into consideration

because of their importance for recreation and tourism. The same limitations apply for this criterion as for the previous one in terms of a detailed inventory.

(3) Association with the River:

Many recreation opportunities are directly associated with or dependent upon the river, especially the water-based activities. Numerous parks, picnic areas, campgrounds, etc. are located on or very close to the river (including reservoirs and tributaries) and clearly exist because of it, to meet public demand for access to the water. Others, such as golf courses and some municipal parks, have only a secondary association; while they may be located fairly close to the river, they do not depend physically or thematically on the presence of the river.

(4) Importance for Tourism:

This criterion is included because there appears to be growing awareness in the Grand River valley of the importance of tourism and its potential contribution to both the economic wellbeing of the area and conservation of heritage resources.

(5) Rarity:

This is a very difficult quality to assess in terms of recreation resources, because no objective or quantitative standards exist which are comparable to those for abiotic or biotic resources. The assessment of rarity in this report is regional to provincial in scope rather than national. Comparison with other major southern Ontario rivers such as the Thames or the Maitland would be useful in this regard.

The areas in the valley which have significant recreational and tourism resources are listed in Table 1 and assessed on a scale of high (H), medium (M) or low (L) scores with regard to each of the five criteria described above. The outcome of this evaluation is scored on the same scale in terms of regional or provincial significance and shown on Map 3.

AREAS OF HIGH PROVINCIAL SIGNIFICANCE:

Fergus/Elora/West Montrose:

The Fergus/Elora/West Montrose area has a great diversity of natural and human recreation opportunities. The Elora Gorge Conservation Area is outstandingly scenic, and provides opportunities for natural resource based activities including canoeing, kayaking (mainly in early spring when the water levels are high), swimming, fishing, picnicking and sunbathing, camping, and cross-country skiing; Elora Quarry is a popular swimming area and is also used for scuba training and some recreational diving by local groups. Elora and Fergus offer many opportunities for viewing historic structures, exhibits, the Wellington County Museum, and a variety of boutiques, arts and crafts shops, and restaurants; among other events, the Highland Games in Fergus attract competitors from across Ontario and the Three Centuries Festival of music is noteworthy as it includes a concert performed on a floating platform in Elora Quarry. The West Montrose covered bridge a short distance south of Elora is among a very few remaining in Ontario. This area is highly significant for tourism at the regional and provincial level, and much of its economy is based on tourism.

Elmira/St. Jacobs:

The significance of the Elmira/St. Jacobs area is based on its human heritage resources, which are principally associated with the Mennonite population of the area. Many tourists visit this area to shop for crafts and antiques and sample Mennonite cooking in the

TABLE 1

Significance for Recreation

AREA	NA	HA	AR	IT	RY	TL	RS	PS
Luther Marsh	M	L	H	L	H	2	M	M
Belwood Lake	H	L	H	L	L	2	M	L
Fergus/Elora/W. Montrose	H	H	H	H	H	5	H	H *
Conestogo Lake	H	L	M	L	L	1	M	L
Elmira/St. Jacobs	L	H	L	H	H	3	H	H *
Guelph and area	H	H	M	H	M	3	H	M
Kitchener-Waterloo	H	H	M	H	H	4	H	H *
Cambridge	M	H	H	M	H	3	H	M
Galt to Paris	H	M	H	L	H	3	M	M
Brantford and area	H	H	H	H	H	5	H	H *
Caledonia and area	M	L	H	L	L	1	L	L
Cayuga and area	M	L	H	L	L	1	L	L
Dunnville to Rock Point	H	M	H	M	M	2	H	M

Key:

NA: Natural activity diversity
 HA: Human activity diversity
 AR: Association with the river
 IT: Importance for tourism
 RY: Rarity
 TL: Total number of high scores
 RS: Regional significance
 PS: Provincial significance

restaurants. It is featured with the Elora area as part of a scenic driving route around Mennonite country.

Kitchener-Waterloo:

A variety of natural recreation opportunities exist in the Kitchener-Waterloo area, provided by Conservation Authority lands, municipal parks, and private parks and campgrounds. Historically Kitchener-Waterloo has not been strongly oriented to the river, but this is changing as the municipal parks and recreation departments review and update their open space plans. The Grand River Corridor Study has also been initiated in recognition of the value and potential of the river. There is a wealth of human heritage resources in the area, including historic buildings such as Woodside National Historic Park, Doon Heritage Crossroads, Homer Watson House, and Joseph Schneider House; museums and art galleries; farmers markets; and events and festivals, including Sounds of Summer, the Central Ontario Exhibition, and the internationally famous Oktoberfest. Also in close proximity to Kitchener-Waterloo is the village of New Hamburg, where the annual Mennonite Relief Sale and Quilt Auction draw thousands of people from the Toronto area, Michigan and New York State.

Brantford and area:

In addition to Brant Conservation Area, many natural activity opportunities are provided by the well-developed municipal waterfront parkland system which extends along the river through the centre of the city. The most significant human/historic resources in this area are associated with the native people and the Six Nations Reserve located a short distance south of Brantford: the Mohawk Chapel, Chiefswood, the Woodland Indian Cultural Centre, and the historic buildings in Ohsweken. Brantford is also known as the location of the Bell Homestead. Events and festivals in this area include Riverfest and the Champion of Champions Pow-wow.

AREAS OF MEDIUM PROVINCIAL SIGNIFICANCE:

Luther Marsh:

This area is very important for naturalists activities and for hunting. It is one of the least developed natural areas in the watershed.

Guelph and area:

Natural activity opportunities are provided by conservation areas at Rockwood and Guelph Lake, which also has a Nature Centre; by Kortright Waterfowl Park and open space along the Speed River through Guelph; and by the University of Guelph Arboretum. There are historic stone buildings, a Civic Museum, and events and festivals.

Cambridge:

There is a strong awareness in Cambridge of the significance of the many historic structures in the city, and the Living Levee parkland developed along the riverbank through the centre of the city focusses awareness on the importance of the river in Cambridge's history. Events such as the annual Riverfest also depend thematically on the presence of the river. Natural activity opportunities are provided by municipal parks and Shade's Mills Conservation Area.

Galt to Paris:

This is the most scenic and most popular section of the river for canoeing. There are many environmentally sensitive areas in this section, and it is very important for naturalists activities. Paris contains a number of historic structures and good examples of rare cobblestone architecture.

Dunnville to Rock Point:

With regard to natural activity opportunities, the emphasis in this area is on boating and fishing. It is estimated that about 30% of the visitors to Byng Island Conservation Area and Rock Point Provincial Park come from the United States. In Dunnville there are several annual events -- the Mudcat Festival, the Flotilla, Thunder on the Grand -- which focus on the river. There are also visible remains in this area of the old canal system developed by the Grand River Transportation Company in the last century which used to connect up with the Welland Canal. There is a lot of interest in this area in restoring navigation on the lower Grand River by building a lock to take boats past the dam in Dunnville.

AREAS OF LOW PROVINCIAL SIGNIFICANCE:

Belwood Lake:

This area has regional significance for provision of outdoor recreation opportunities.

Conestogo Lake:

As in the case of Belwood, this area has regional significance because of the range of outdoor recreation opportunities it provides.

Caledonia and area:

Natural activity opportunities are provided by Lafortune Conservation Area and municipal parkland along the riverbank. A short distance north of Caledonia is the Big Creek Boat Farm, which offers a unique recreation opportunity in the form of riverboat cruises on the Grand. In Caledonia there is an old mill which is considered historically significant because of its rare architectural style, as well as several historic buildings in the town. Local events and festivals employ themes associated with the river.

Cayuga and area:

The main attraction in this area is the Cayuga Speedway, which of course has no relation to heritage resources although it is important for tourism. There are historic municipal buildings in the town itself, and natural activity opportunities are provided at Taquanyah Nature Centre.

AREAS OF HIGH SIGNIFICANCE FOR NATURALISTS ACTIVITIES:

There are three areas in the Grand River valley which provide significant opportunities for naturalists activities: Luther Marsh, the Dumfries landscape complex between Galt and Paris, and the marshes around Dunnville and in Byng Island Conservation Area. These are shown on Map 4.

CONSTRAINTS FOR RECREATION

In the ABC method, cultural constraints have been mapped using a conflict-tension-compatibility spectrum. An area is included in the conflict category if it is characterized by the continuation of a historic and largely unresolved conflict, by a new land use, or by an increase in the intensity or extent of an existing use perceived to have adverse effects on other uses or the resources needed for them. The tension category is applied to areas being evaluated for development which may have adverse effects on other uses or the resources or environment upon which these uses are dependent, or areas in

which a decrease in the extent or intensity of a land use has created problems for other uses. Compatibility areas do not meet the criteria for either conflict or tension (Grigoriev, Theberge and Nelson, 1985:68-70).

With reference to recreation, three kinds of constraints have been identified in the Grand River valley: (1) constraints arising from conflict or tension between recreation and other land uses; (2) constraints arising from conflict or tension among different recreational activities occurring at the same place and time; and (3) constraints resulting from natural conditions (which may be man-induced) that restrict recreation opportunities.

In the first category, i.e. constraints arising from conflict or tension between recreation and other land uses, tension zones have been mapped around the urban areas in the valley (Map 5). While the urban centres provide many recreation opportunities, industrial and residential development compete for space and funding. Discharge of effluents from industrial operations and sewage treatment plants may have adverse effects on opportunities for water-based recreation, although this is not a major problem at present. Also indicated on Map 5 are the dams or weirs which canoeists have to portage when travelling down the river. In Kitchener-Waterloo the Mannheim project will mean construction of an additional weir on the river at Freeport. A proposal has also been made for a dam and reservoir at West Montrose.

In considering constraints associated with development, however, it should be recognized that there is potential for positive as well as negative effects on recreation opportunities. In some instances, well-planned modifications to the landscape can enhance certain characteristics, for example fish habitat, rather than necessarily having a detrimental effect. While some recreation opportunities may be displaced, other new ones may be created.

Below Brantford, the Six Nations have a land claim to the bed of the river through their reserve which, if successful in the courts, could result in restriction of public access to that section of the river. Even at the present time there are no designated access points on the river between Brantford and Lafortune Conservation Area near Caledonia.

In Port Maitland, International Mineral and Chemical (IMC) has a large industrial plant located immediately adjacent to the mouth of the Grand River and Rock Point Provincial Park.

In the second category, i.e. constraints arising from conflict or tension among different recreational activities occurring at the same place and time, there appear to be two major types of conflict, which are shown on Map 5. First, hunting is allowed at Luther Marsh and Conestogo Lake Conservation Areas and the Dunnville marshes; although it is controlled, it is not compatible with wildlife viewing and other non-consumptive activities which occur in these areas in the fall and winter.

The second type of conflict among different recreational activities is between motorized and non-motorized boating. In the upper valley, power boats are allowed on the reservoirs at Belwood and Conestogo. Below Brantford, where the river is wide and deep enough for power boats, the same kind of conflict exists on a larger scale. If the proposed lock is constructed at Dunnville, allowing many more and larger power boats access to the river as far as the next dam at Caledonia, these conflicts will likely intensify. This was a concern of participants at the public meeting in Caledonia (June 13, 1988).

The third category of constraints refers to those resulting from natural conditions (which may be man-induced) that restrict recreation opportunities (Map 5). The main natural constraint for water-based recreation on the Grand above Brantford is low water levels. With the exception of the reservoirs, the water is generally too shallow for anything but canoes or kayaks. Canoeing or kayaking above Elora is possible only in early spring; by mid-June a canoe may have to be dragged off shoals in a number of spots between Elora and Brantford. If current predictions of climatic change prove to be correct, this situation may be aggravated by warmer, drier summers. The low water levels limit swimming as well. This constraint is considered tension rather than conflict.

Associated with the low water levels in the upper river is the presence of algae at certain times. This is largely a question of perception; some people find it detracts from their experience while others apparently do not.

The lower river south of Brantford carries a heavier sediment load, which diminishes the appeal of the water for swimmers. Again, this is considered tension rather than conflict. People still swim in the river, depending on their perception of its attractiveness. However, designated swimming areas in the lower river are for the most part man-made pools or ponds.

A general constraint which has not been mapped is the issue of public access to the water. Most riverfront property is privately owned, and deeds on riverfront properties vary from the bank to the middle to the entire river, depending on the township and the navigability of the river. This puts a great deal of stress on the public lands bordering the river because of the demand for access to the water for recreational purposes.

There are several general constraints for tourism along the Grand River. The first is the need for more co-ordination among the various municipalities in the valley which was discussed above; associated with this is a lack of funding for tourism-oriented projects. However, a number of municipalities are starting to address this problem, notably through initiatives such as the Grand River Corridor Study, the Inter-Municipal Tourism Committee, and the Haldimand-Norfolk Tourism Strategy study. The region also suffers from the existence of competing opportunities within approximately the same driving time from major markets; established vacation areas along the shores of Georgian Bay, Lake Huron and Lake Erie attract the lion's share of overnight visitors.

In terms of structural constraints, the transportation routes along the Grand are not particularly conducive to tourism. In the central and upper parts of the valley especially, there is no easy or obvious road system allowing one to follow along the length of the river. Also, the discontinuity around Brantford is rather confusing to a driver unfamiliar with the area.

In the central part of the valley there are well developed support facilities for tourism; from Elora to Brantford there is a range of accommodations, restaurants, shops, and so on. Below Brantford, however, there are very few such amenities, and this is an important constraint for tourism.

MANAGEMENT ISSUES

The most pervasive issue for management of recreation along the Grand River is public access to the water. An expanded system of public open spaces and/or trails adjacent to

the river is a way of linking the natural and human heritage features associated with the Grand River. If the river is viewed in terms of a linear recreation corridor, there are many discontinuities along its length. Pressures on the public lands bordering the river are likely to increase in the future.

A second issue which pertains to the whole river is that of water quality. While it is generally quite satisfactory for recreation activities at present, care must be taken to ensure that it remains so. This applies not only to urban and industrial areas but also to agricultural areas. Above Brantford, low water levels in the summer months can also restrict recreation opportunities.

The third issue which must be considered is the management of conflicts among different recreation activities. The main one at present appears to be between motorized and non-motorized boating along the river below Brantford.

CONCLUSION

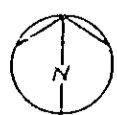
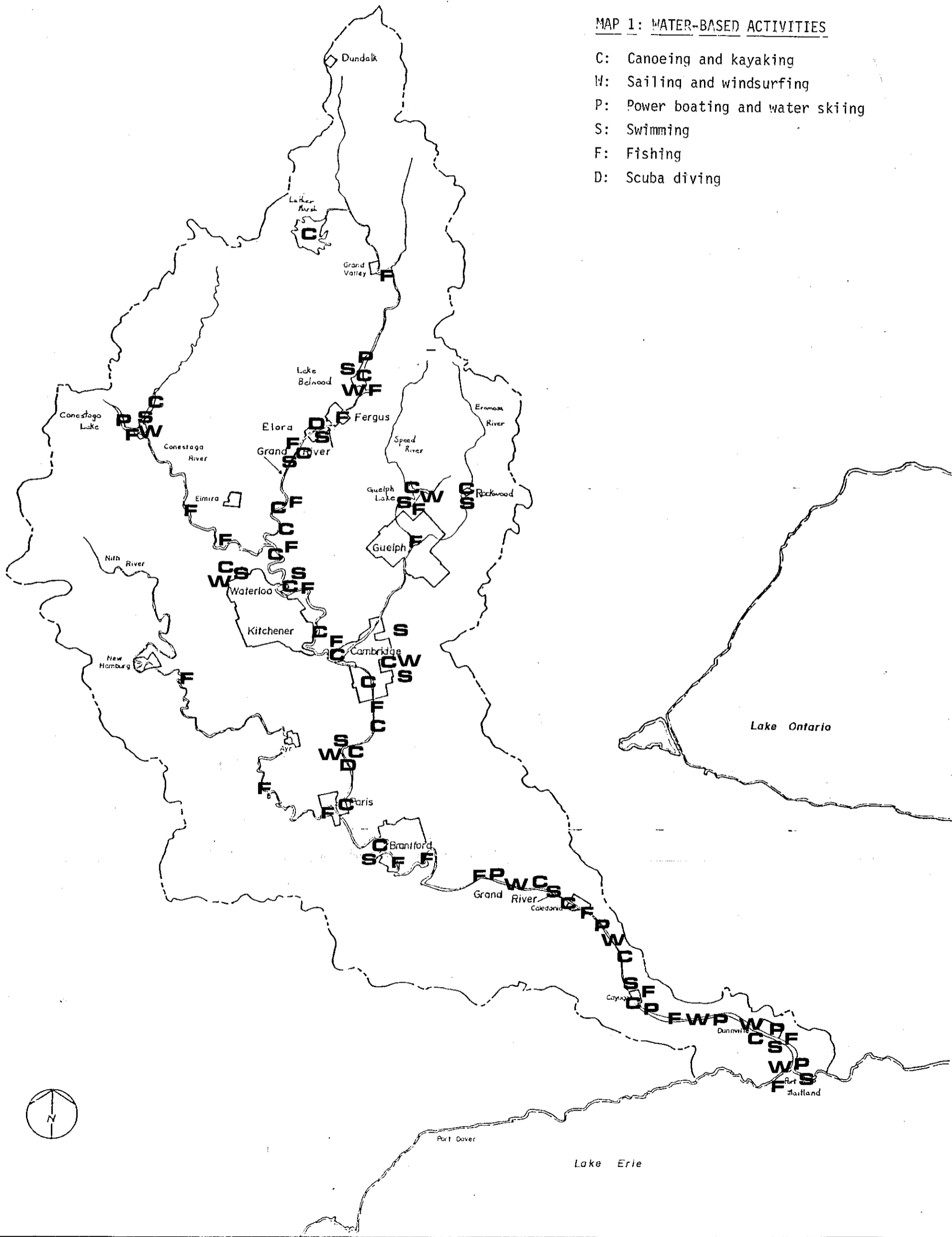
Recreational values are inextricably linked to the resources upon which the recreational activities are based. In the case of the Grand River valley, the numerous and diverse recreation opportunities which exist, from relatively natural to urban, derive their significance from both the natural and human resources associated with the river and its history. This diversity of recreation opportunities is particularly special in the context of a settled, southern river; it enhances the uniqueness of the Grand River valley and strengthens the case for the Grand as a Canadian Heritage River.

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES
Date prepared - 1988.

MAP 1: WATER-BASED ACTIVITIES

- C: Canoeing and kayaking
- W: Sailing and windsurfing
- P: Power boating and water skiing
- S: Swimming
- F: Fishing
- D: Scuba diving

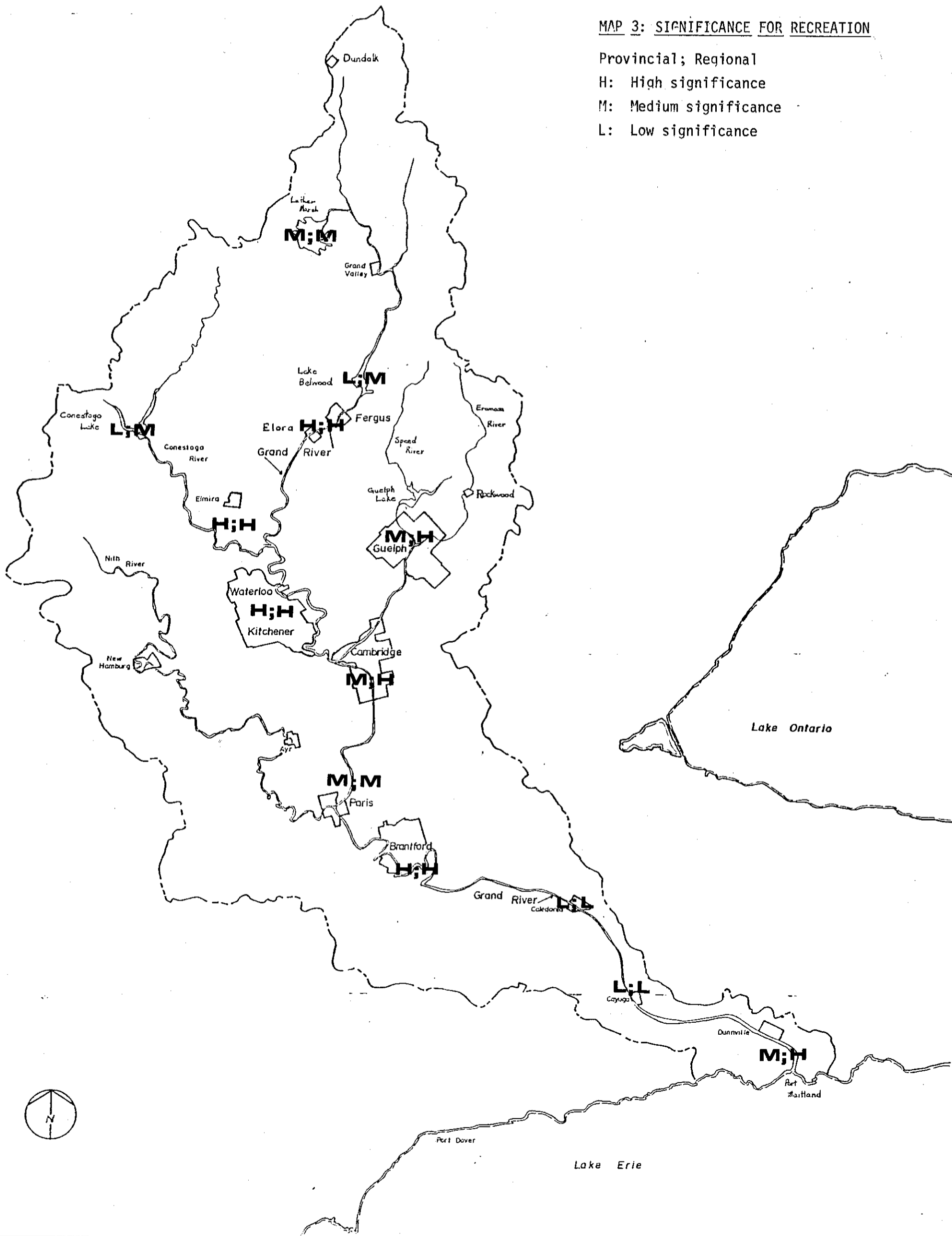


GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 8
 Date prepared - 1988.

MAP 3: SIGNIFICANCE FOR RECREATION

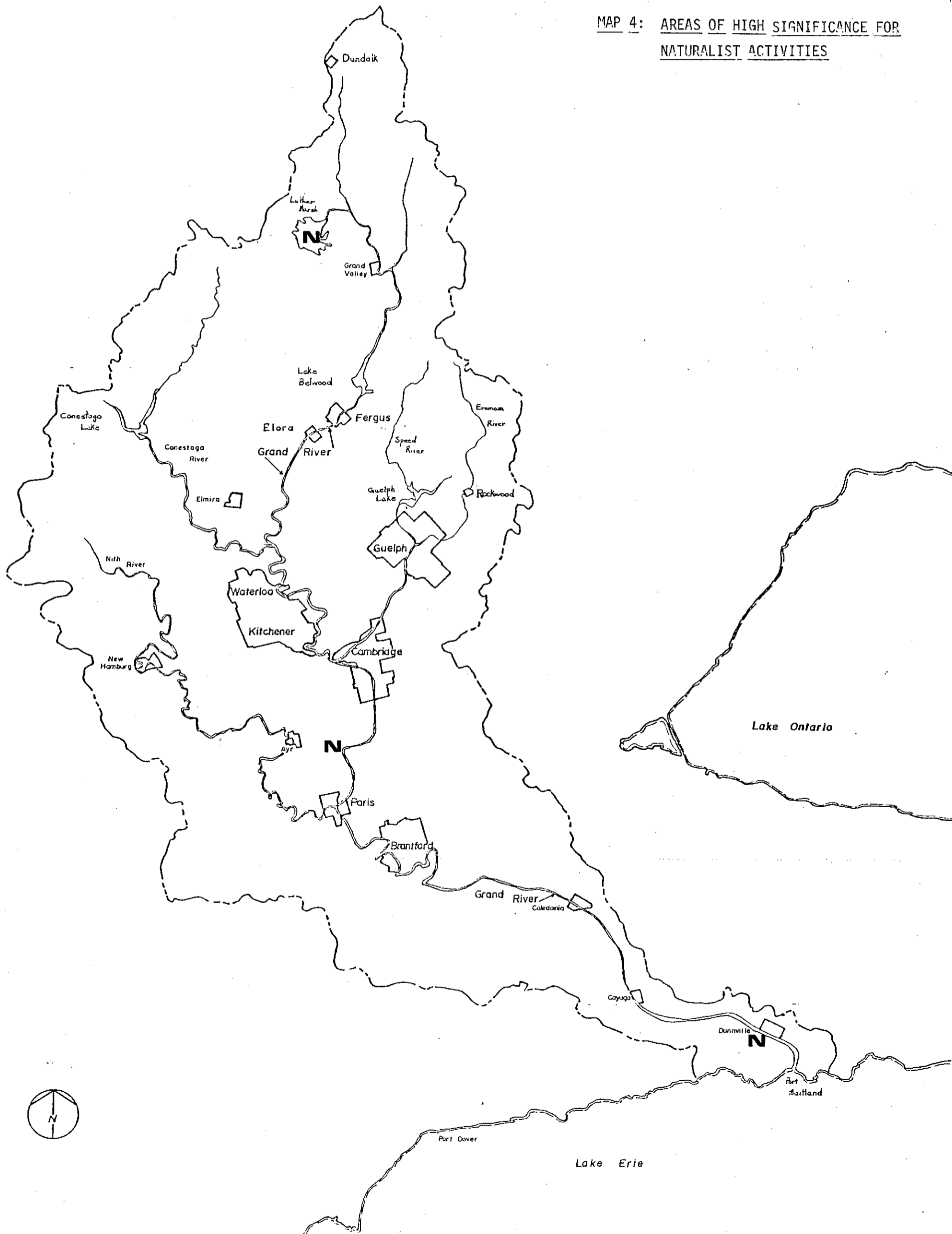
Provincial; Regional
 H: High significance
 M: Medium significance
 L: Low significance



GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5 6
Date prepared - 1988.

MAP 4: AREAS OF HIGH SIGNIFICANCE FOR NATURALIST ACTIVITIES

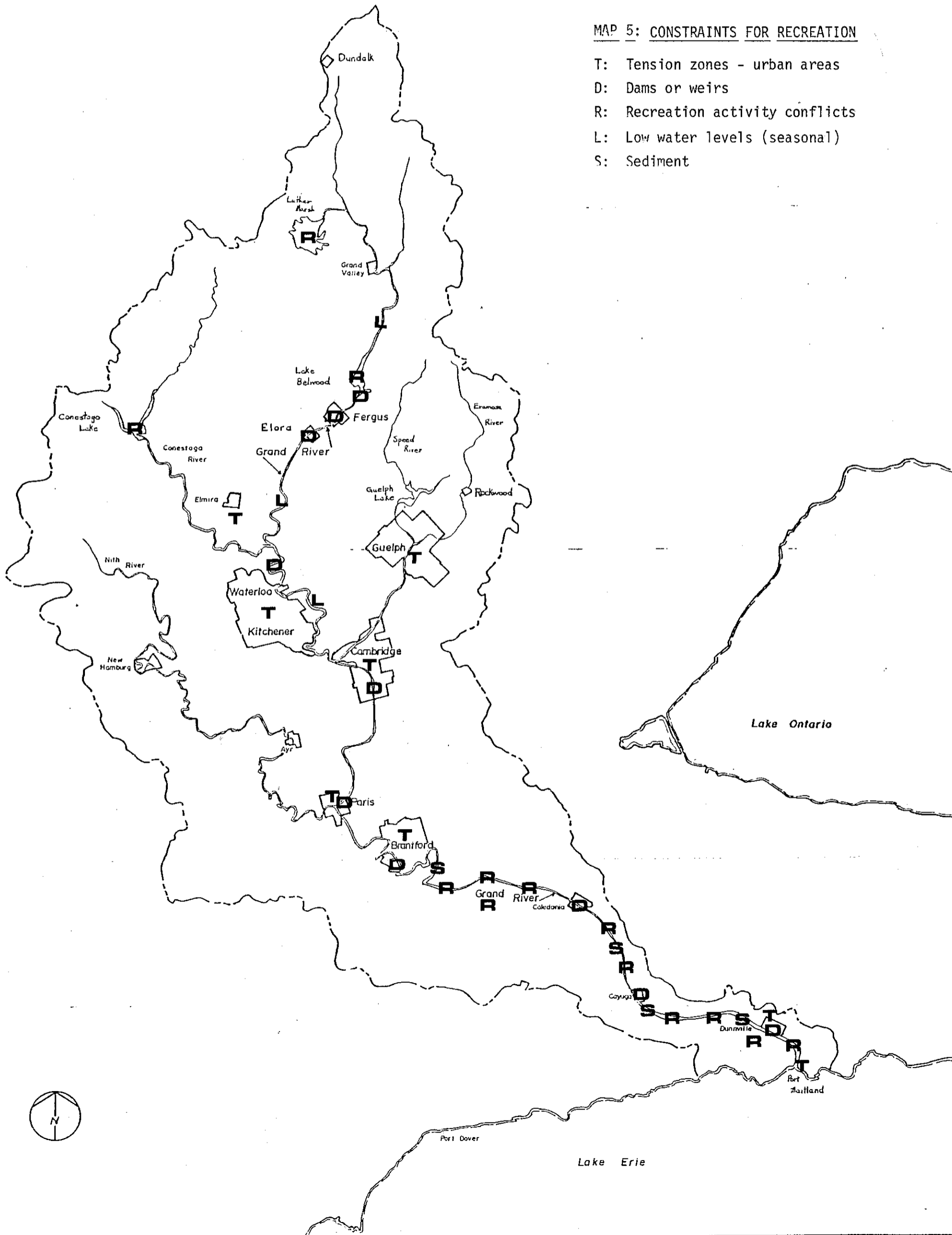


GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5 6 7 8
 Date prepared - 1988.

MAP 5: CONSTRAINTS FOR RECREATION

- T: Tension zones - urban areas
- D: Dams or weirs
- R: Recreation activity conflicts
- L: Low water levels (seasonal)
- S: Sediment



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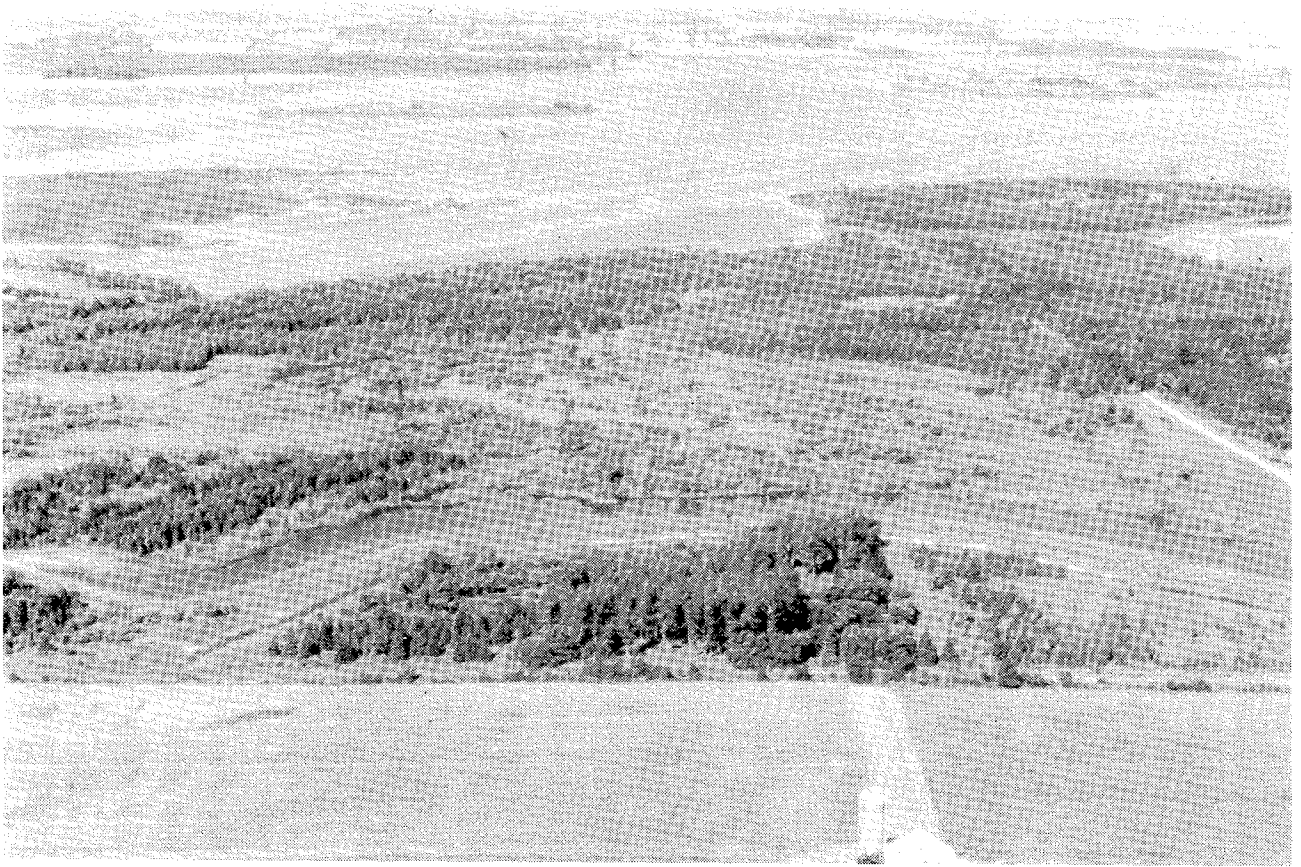
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Parks and Protected Areas

George R. Smith



CONTEXT

Parks and protected areas is a term used to describe, in summary fashion, the many different kinds of public and private lands which have been set aside or regulated over the years for purposes such as recreation and conservation or some combination thereof. For most people a park is an area of public land, managed primarily for its recreation potential and secondly for its value for wildlife, historic or other forms of conservation. A protected area is considered to be public or private land managed primarily for its value in conserving natural or human heritage, and secondly, for recreation. Examples of parks vary from Woodside National Historic Park through Rock Point Provincial Park on Lake Erie's shores, to Victoria Municipal Park in Kitchener. Examples of protected areas range through Luther Marsh, a GRCA northern wildlife and multiple use area, to OMNR Agreement Forests, municipal ESAs and OMNR Areas of Natural and Scientific Interest (ANSIs).

A special note should be made of the effort to identify and protect Carolinian Forest areas within the Grand River basin. The OMNR, the GRCA, the Natural Heritage League, the University of Guelph, and other public and private groups are all involved in this work. Six Carolinian Canada sites are located in the basin, including Beverly Swamp east of Cambridge, Sudden Bog, and Grand River Forests south of Cambridge, Spottiswood Lakes about 10 kilometres to the southwest of Cambridge, the Six Nations Reserve south of Brantford, and the Oriskany Sandstone area west of Cayuga. These areas are discussed in more detail in the biotic section of this study.

Tourism is a developing industry in Ontario, being promoted aggressively by the federal government, the province, and local tourist organizations. From a tourist point of view, the Elora Gorge, Luther Marsh and the Lake Erie shoreline all have significant future potential for development. However, this potential has to be balanced against the need for protection of natural and human heritage features.

In terms of major influences on parks and protected areas within the Grand River basin, the most important individual agency is the Grand River Conservation Authority. Through management of over 17,000 hectares of land for purposes of conservation and recreation, the Authority provides facilities and opportunities for not only the Grand River area, but also surrounding parts of southern Ontario.

PATTERNS

As Figure 1 shows, no national parks are located within the Grand River basin. The closest are Point Pelee National Park south of Windsor and the new Bruce Peninsula National Park to the north and west. There is, however, a successful National Historic Park, Woodside, located in the Kitchener-Waterloo area. Only one provincial park is found in the basin, this being Rock Point Provincial Park on the Lake Erie shore.

The GRCA has a total of fifty-seven designated or protected areas, catalogued variously as demonstration areas (2), flood control areas (19), flood plains (20), fish, wildlife and wilderness areas (3), and recreation areas (13) (G.R.C.A. 1987 Annual Report). In addition, the GRCA has 1665.2 hectares of reforestation area and 589.1 hectares of source area lands. All of these lands function to a greater or lesser degree as both conservation and recreation areas.

Most GRCA managed lands are directly connected to the Grand or related water features such as Luther Marsh. Rock Point Provincial Park is also linked to water, although in this case the water is Lake Erie east of the mouth of the Grand River. Even major urban parks are for the most part located on or near the Grand River, such as the river park in Guelph's south end, Cambridge's waterfront park system and Kitchener's Homer Watson park.

SIGNIFICANCE

Table 1 provides details on significance criteria (Smith and Theberge, 1986). On the basis of these criteria park areas were rated high, medium or low in terms of their contribution to heritage use and conservation along the Grand River.

All Carolinian Canada park and protected area sites are rated high, primarily due to their rarity and other values on a national basis. Other areas of high significance are Rock Point Provincial Park, Luther Marsh, and Elora Gorge. Low significance was assigned to a number of sites largely because of their small size and distance from the river. All other sites have been rated as of medium significance.

CONSTRAINTS

Many small and relatively isolated parks and protected areas are judged to be highly constrained due to small size and nearby development stresses. Other sites are highly constrained by water pollution as found around Kitchener-Waterloo, Cambridge and the Dunnville area. Four sites with low constraints are: the Guelph dam site, the Conestogo dam site, Luther Marsh and Elora Gorge. These parks or protected areas are relatively large and located in more expansive and less stressed surroundings.

MANAGEMENT ISSUES

A future trend of major concern, especially to the Carolinian Canada sites, is the relatively rapid urbanization of the central basin area. Sites in this area must be protected soon or risk being lost to subdivision and other development. The joint effort between the GRCA and the provincial government and other groups to identify and analyze these sites in order to evolve a management strategy is ongoing and could be concluded in 1989.

The Grand River Conservation Authority is a key management agency in terms of parks and protected areas. Urban areas are the second largest management agencies collectively. These agencies should be encouraged to cooperate where possible in joint efforts at promoting, developing and maintaining parks and protected areas in the Grand River valley.

The Grand River offers a special opportunity to manage parks and protected areas for the benefit of one of the largest concentrations of people in Canada. The parks and protected areas in the Grand River basin offer valuable natural, historic and recreational opportunities which are admittedly different than those found in more isolated wild areas in Canada. Nevertheless these more civilized parks and protected areas are an important part of our natural, human and recreational heritage and can continue to contribute in this regard in future with appropriate recognition, planning and management.

TABLE 1

**Parks and Protected Areas Significance
Criteria**

a) Ecological Criteria

- Rarity/uniqueness
- Diversity
- Size
- Naturalness
- Fragility
- Importance to Wildlife

b) Cultural Criteria

- Educational Value
- Scientific Value
- Recorded History, Research Value
- Recreational Value
- Cultural Resources

c) Planning/Management Criteria




- Size
 - Consideration of buffers and boundaries
 - Ecological or geographic location
 - Accessibility
 - Conservation effectiveness
-

Figure #1.

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES
Date prepared - 1988.

Parks and Protected Areas
Patterns Map

-  Urban Park / Protected Area
-  G.R.C.A. Lands
-  Provincial and Other Parks and Protected Areas

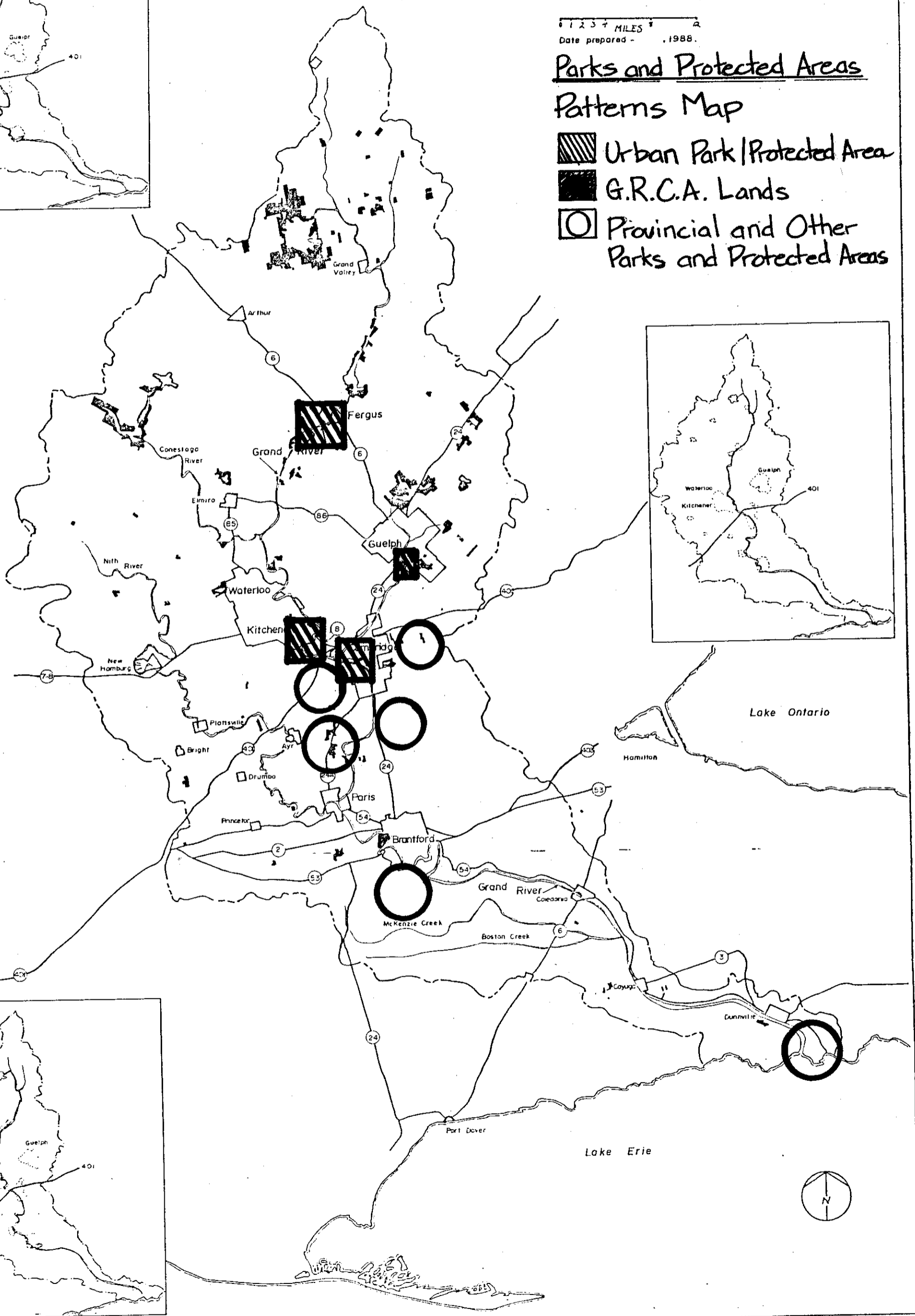
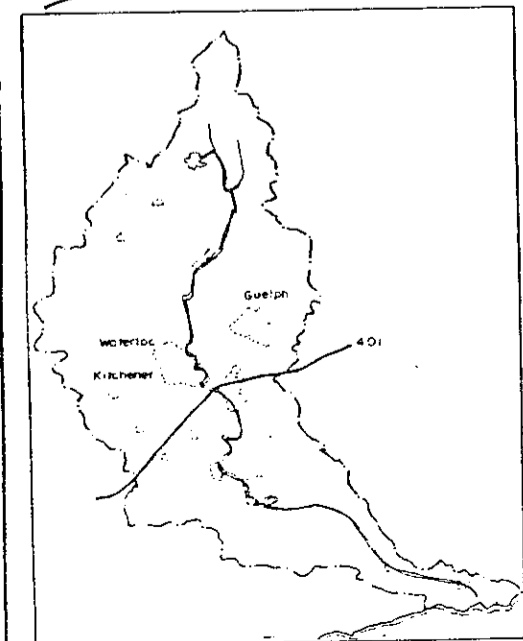
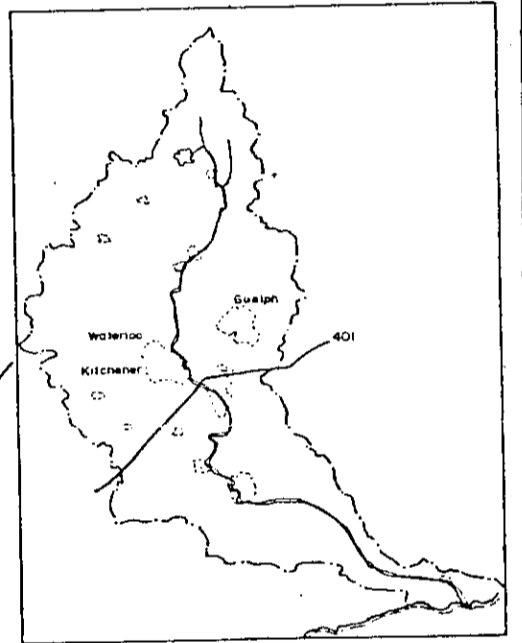
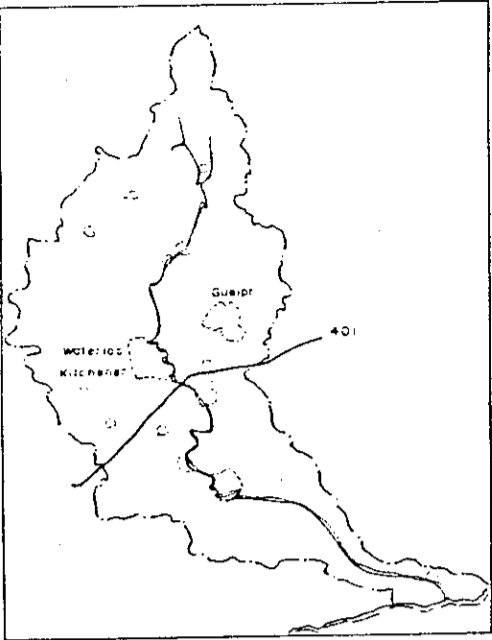


Figure #2.

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES
Date prepared - , 1988.

Parks and Protected Areas

Significance Map

- Highly Significant Areas
- ▨ Areas of Medium Significance
- Areas of Low Significance

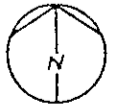
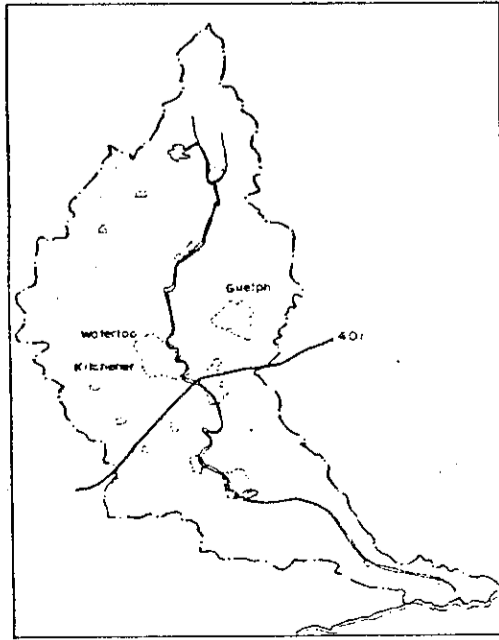
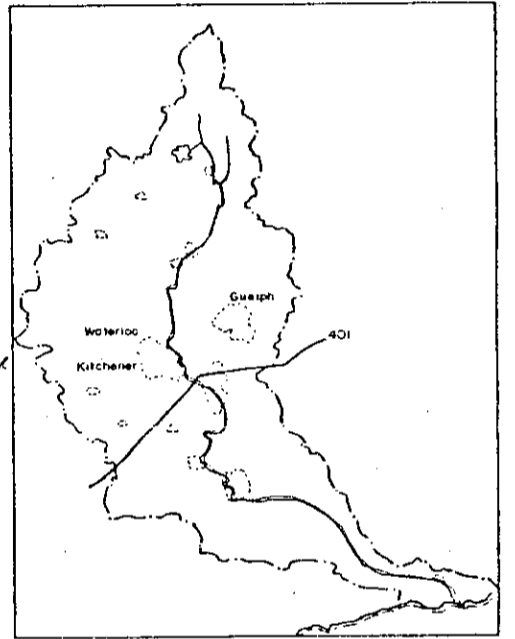
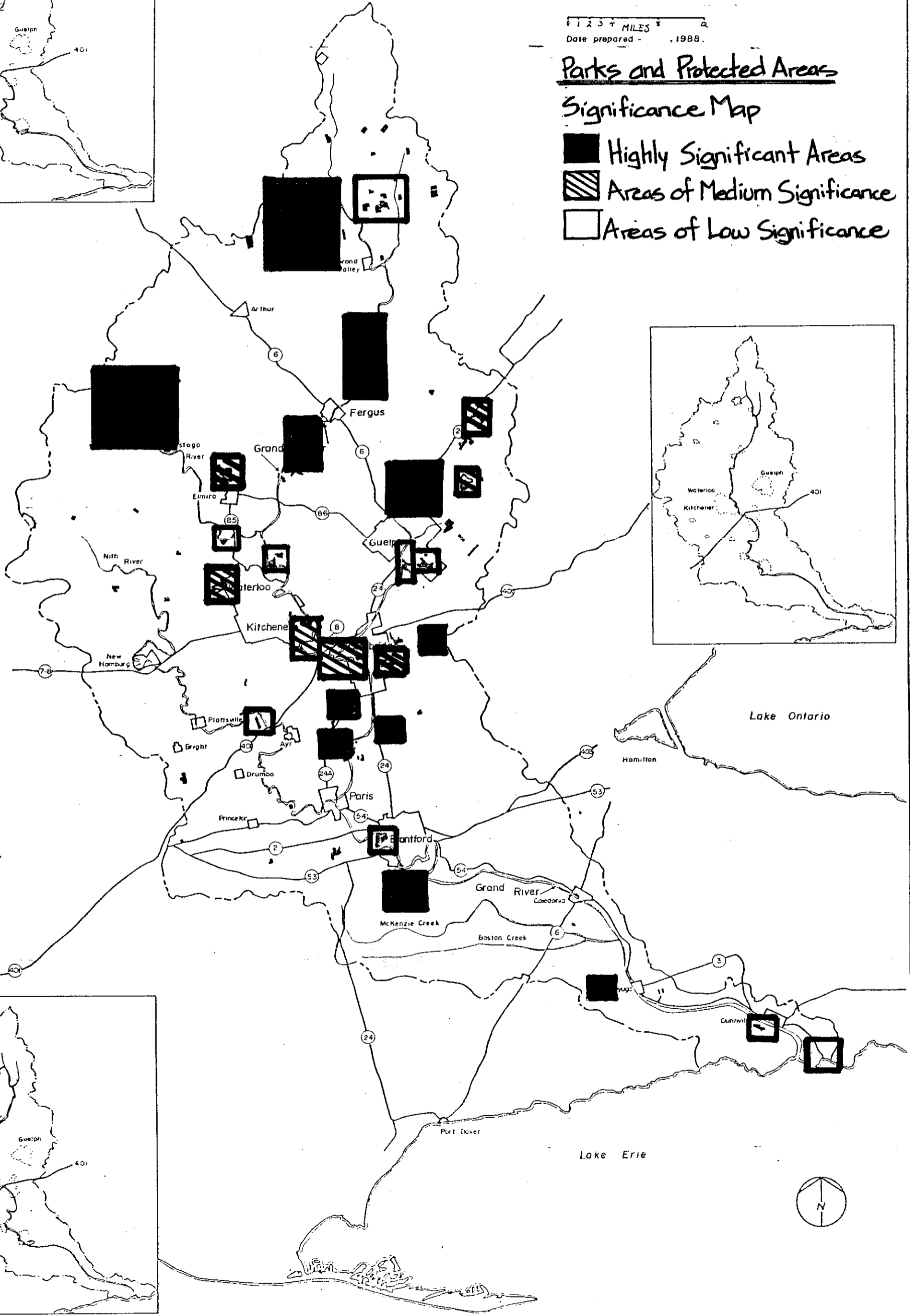
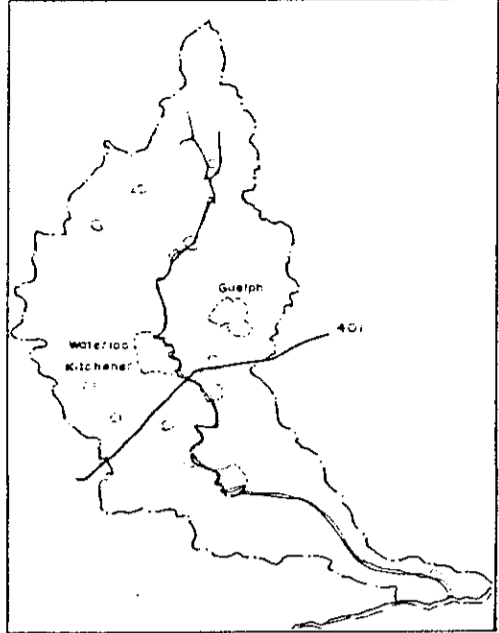


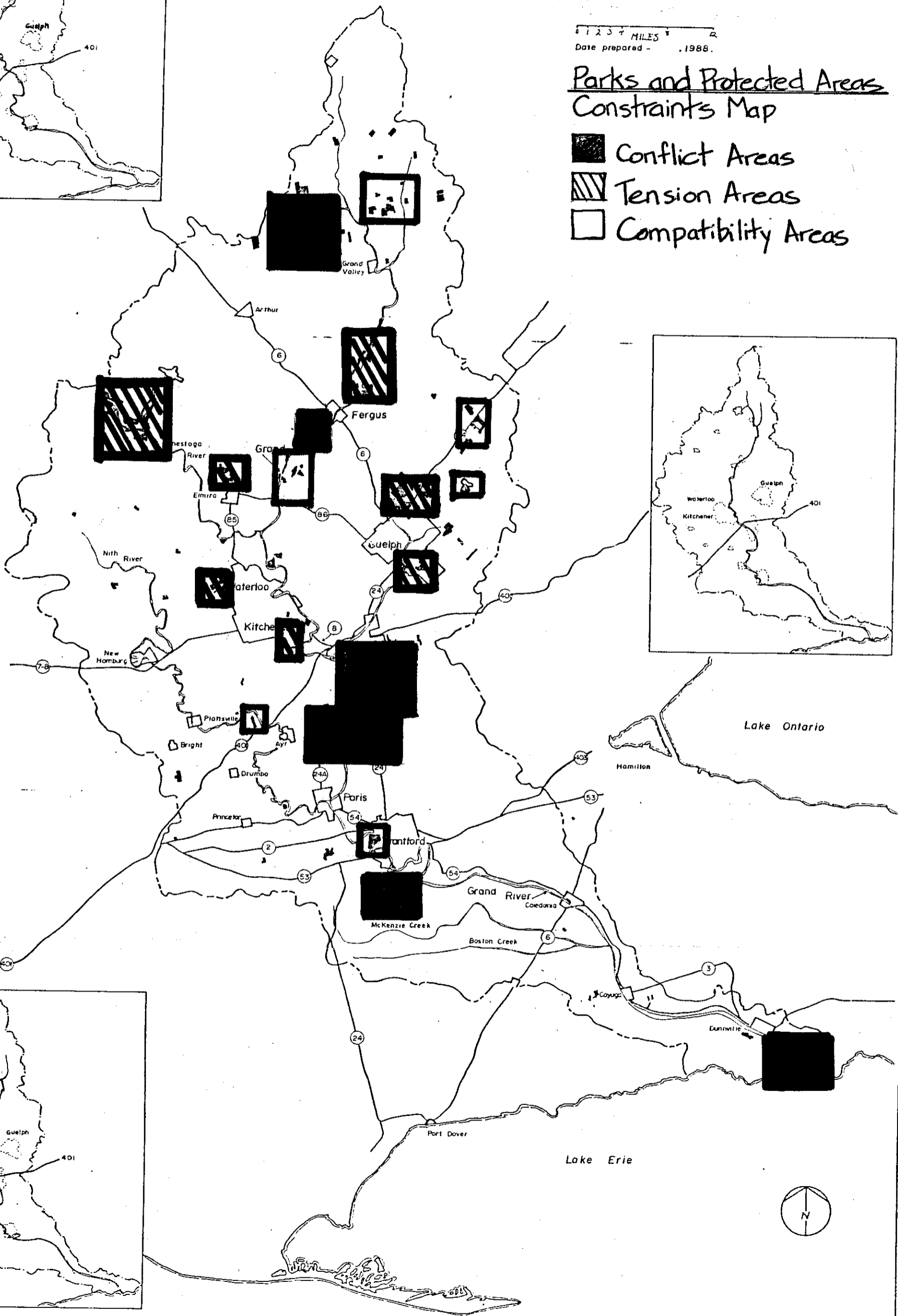
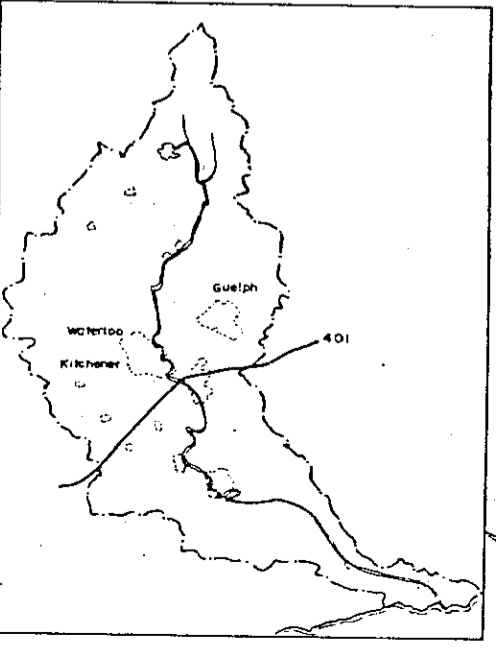
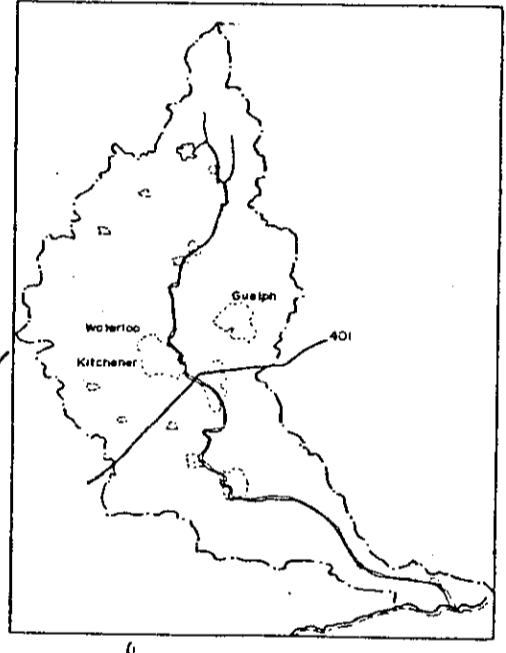
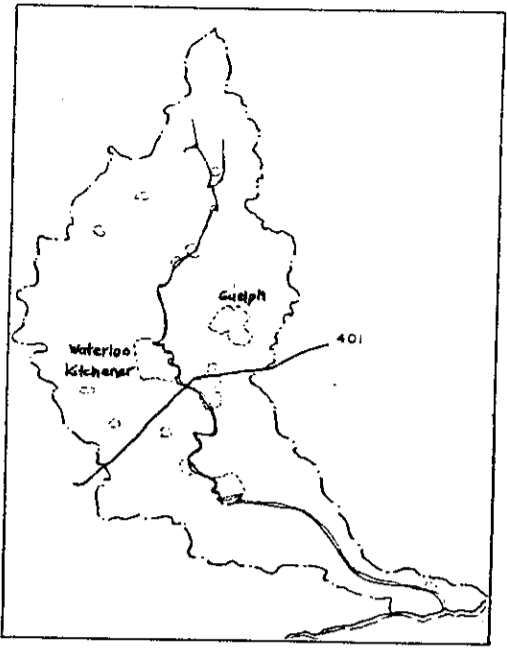
Figure #3.

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES
Date prepared - .1988.

Parks and Protected Areas
Constraints Map

- Conflict Areas
- ▨ Tension Areas
- Compatibility Areas



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Grand River Valley Trail Systems

Chris Hart



CONTEXT

Origins:

If the Bruce Trail is recognized as the progenitor of the hiking trail movement in Ontario, then trail development has borrowed from the American experience of the Appalachian Mountain club and the associated Appalachian Trail system of the eastern U.S. Indeed the Appalachian Trail was the model for the Bruce Trail system. Following completion of the Bruce Trail in 1967, there was a flurry of construction activity for ten years throughout Ontario, oriented to completion of similar pedestrian trails. Prior to this time, the only designated trail systems were either in parks or part of municipal walkways. Public awareness of natural resources and the increasing influence of groups such as the Federation of Ontario Naturalists and the Bruce Trail Association served to spur the fledgling trail movement onwards. As a result, four trail systems existed in the Grand River Valley by 1977.

Grand Valley Trail:

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. This 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 to 250 km, double its previous length.

Avon Trail:

The Avon Trail Club was incorporated in 1973 to oversee the development of a link between the Thames Valley Trail to the west, and the Grand Valley Trail. The initial incentive for developing the Avon Trail was provided by the Thames Valley Trail Club which secured a small grant for the purpose in 1973. The main developmental thrust started in the vicinity of Stratford and the trail was built outwards from there to a final length of 103 km.

Guelph Radial Line Trail and Speed River Trail:

The Guelph Trail Club maintains both the Guelph Radial Line and Speed River Trails which can be considered as one continuous system, although they were built separately. The Radial Line Trail was first constructed between 1970 and 1971 by a group of enthusiastic Guelph hikers who wanted a link to the Bruce Trail. With the incorporation of the Guelph Trail Club in 1972, a push was made to expand the system with an extension down the Speed River Valley to the former City of Preston being completed in the same year. An informal link with the Grand Valley Trail was created shortly afterwards between Preston and the old Village of Freeport, with signs being put in place in 1988. Between 1972 and 1974 three major trail loops (Arkell, Starkey, and Hanlon) were also constructed. The current length of the main trails is 65 km. The loop trails vary in length from 6 to 8 km.

Nature Conservation:

Trail systems in Ontario are seen by many people interested in nature conservation as being a means to focus public attention on unique natural areas. This hidden agenda has played a part in development of both the Bruce and Grand Valley Trails. Natural corridors through which trails pass frequently contain higher concentrations of wildlife and greater variety in vegetation, than found in the generally adjacent countryside, due to preferential routing. As well, natural features such as the Niagara Escarpment, valley,

and floodplain lands along river trails are more readily explored, making them attractive to out-of-door enthusiasts who are potential allies for their preservation on the grounds of unique natural features or aesthetic qualities.

Family Recreation:

Current demographic trends in Ontario reflect the post-Second World War 'baby-boom'. Children from this period are now adults well into their child-rearing years. At the same time, trail club memberships are experiencing slow but steady growth. Hiking activities may easily be family-oriented as they are inexpensive and trails are situated near to urban centres.

Walking and Fitness:

Fitness trends have also begun to favour senior citizens with an emphasis on appropriate forms of exercise such as low-bounce or no-bounce aerobics and walking. For these reasons, hiking trails have gained in importance this decade for fitness enthusiasts but especially for people of fifty years of age and older. As well, many people find trail clubs and associations good places to meet new friends and develop lasting relationships with hiking partners.

Education:

As most, if not all, trails provide access to unique natural areas and a wide variety of habitats and environments, they provide the milieu for trips of discovery into the world around us. Easy access to camping in parks or conservation areas provides opportunities for both short and extended visits of school groups, scout and girl-guide troops, church groups, school outer's clubs, and so on, for educational purposes. For those persons who can plan extended trips, the Grand Valley Trail in particular offers opportunities to observe closely changes in vegetation and wildlife between climatic zones and different regions of soils and geology.

The opportunity to view the countryside in an historical context and participate in popular culture is important. The Guelph Radial Line Trail follows the course of an old and extensive electric rail system of transport that at one time was extant throughout Ontario. All trails in the Grand River Valley pass through established smaller towns and villages which had unique functions in the settlement of this part of Ontario. Through a day's stroll, trail users may develop a better grasp of the history and heritage of their immediate locality.

Variety of Experience:

From the aforementioned it is seen that hiking trails and associated clubs provide for a wide variety of experiences for a diversity of users. Southern Ontario has one of the highest concentrations of pedestrian walkways outside of park systems that is to be found in other provinces. Of the eight formal trail systems in the province, four pass through the Grand River Valley with connections to trails in adjacent watersheds to the east and west.

PATTERNS

As shown in Figure 1, the Grand Valley and Speed River Trails follow their respective river valleys. The Avon and Guelph Radial Line Trails are largely cross-country; the

former initially follows the Avon river to its headwaters before crossing into the Grand River watershed in the Conestogo River Valley and joining the Grand Valley Trail at the confluence of the Conestogo and Grand Rivers. The Guelph Radial Line Trail follows the route of an abandoned electric railway as it leads east from Guelph to a link-up with the Bruce Trail outside of the watershed at the village of Limehouse. There are no user statistics for any trails within the Grand River watershed to define patterns of usage.

While hiking trails by their nature are dynamic, all trails, with the exception of the Grand Valley Trail, are essentially completed. The Grand Valley Trail currently leaves the Grand River Valley at the village of Belwood where it heads east across-country to the village of Alton in the Credit River watershed. Here it joins the Alton Side Trail for a link to the Bruce Trail system. Future plans include an expansion further up the Grand River Valley from the village of Belwood. The proposed route will likely go through the towns of Grand Valley and Shelbourne with a link to the Bruce Trail near Horning's Mills. The Speed River Trail may one day be extended up the valley to Guelph Lake and possibly beyond, but as yet there are no definite plans to do so.

Abandoned rail lines such as the Galt to Lynden Junction south of Cambridge may become available for conversion to pedestrian and equestrian trails. One line (C.P.R.) from Galt to Brantford is especially attractive for this use. Provincial trail and conservation organizations are actively lobbying for protection of these abandoned rights-of-way and their associated corridors.

Major nodes occur wherever any of these trails intersect. Both the Alton Side Trail of the Bruce Trail and the Welland Feeder and Merritt Trails act as valuable links to the Bruce Trail system for the Grand Valley Trail; the Speed River and Guelph Radial Line system also does to a certain degree. Major corridors may be said to surround all trails within the Grand River Valley. No known disjunctions exist other than the great unrealized potential for hiking in the upper portion of the Grand River watershed.

There are current plans to expand municipal trail systems in the cities of Waterloo, Kitchener and Cambridge (Regional Municipality of Waterloo), and Guelph (Wellington County). It is expected that the Avon, Grand Valley and Speed River Trails will provide valuable internal and external linkages between municipal trails through proposed park systems within valley lands. These plans are part of long-term, 10 to 15 year, strategies for recreation lands and underscore the importance of the access currently provided by the major trails.

SIGNIFICANCE

Nowhere else in the Province of Ontario is the concentration of pedestrian footpaths as great as in the Grand River Valley. Within the basin are opportunities for long distance treks of up to 250 km in length, with greater distances possible through external links. The close proximity of the Avon Trail and the Grand Valley Trail to municipal trail systems in Waterloo and Kitchener, respectively, make both of these trails especially important in an urban sense as is found with the Speed-Guelph trails. Urban dwellers can have easy access to the near countryside and high quality natural experiences. All trails are found to tie together sites of natural and cultural influence and natural and man-made landscapes. The Grand Valley Trail is the only continuous recreation corridor the length of the Grand River Valley with the potential to be expanded as access to existing and potential parks and recreation lands. As well, such a trail can provide continuous access to many heritage features throughout the Grand River Valley.

CONSTRAINTS

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-governmental groups and pass over private lands, with the permission of individual land owners, the trail routes are insecure in most cases. Only where trail routes pass over public lands may they be secured. In most political jurisdictions through which major trails pass they are acknowledged and may be plotted on official maps, but are not included in official regional or municipal plans although they may be part of long-term strategies. This situation leaves all portions of major trail routes not on public lands in an insecure long-term position.

The majority of individual property owners have been supportive in granting access to trail clubs, but response has been variable depending on local attitudes. In order to address questions such as route security the Federation of Ontario Hiking Trail Associations has been lobbying the provincial government for a revamped Ontario Trails Council in the last year. It is likely that another will be established to develop a status report on trail resources in Ontario.

There seems to be a general lack of local support in rural communities for abandoned rail lines to be converted to pedestrian or equestrian trails. Unless current reluctance on the part of some rural residents is overcome it is not likely that conversion of rail line rights-of-way to trails will progress smoothly.

MANAGEMENT ISSUES

Even the Bruce Trail Association, with the most elaborate and well-developed volunteer trail administration, does not have a comprehensive management plan. No formal management plans exist for any of the trails in the Grand River Valley. The municipalities through which all trails pass should see to it that major trails are protected in city and regional plans.

In future it may be possible for the province to provide funding, as with the Bruce Trail, to secure routes. Until such time it would be wise for all agencies whose actions may bear on future trail development, such as regional government and the Ministry of Natural Resources, formally to designate trail routes as shown on some MNR district maps. This will provide a basis for formal recognition and hopefully future protection of trail corridors.

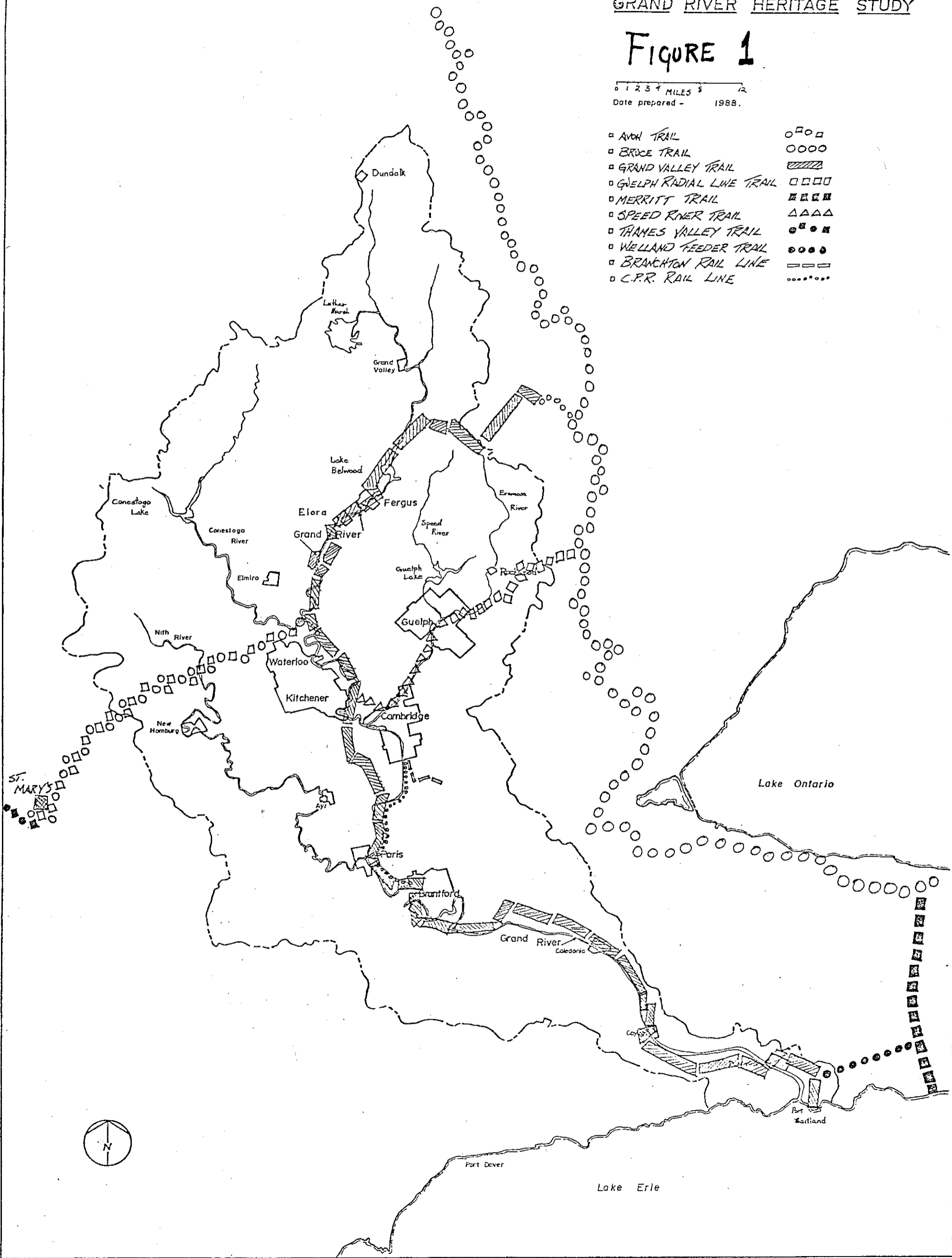
TRAILS

GRAND RIVER HERITAGE STUDY

FIGURE 1

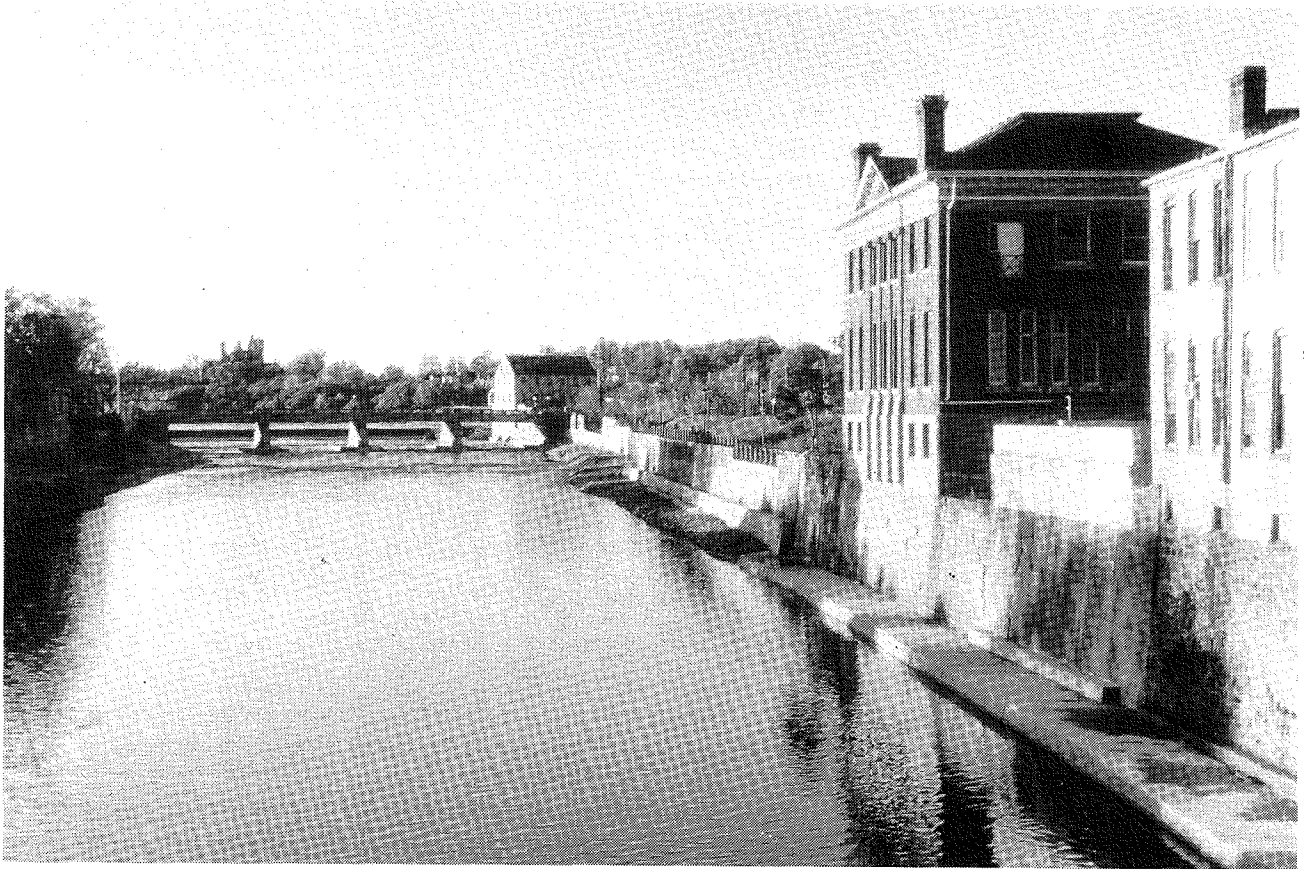
0 1 2 3 4 MILES 5
Date prepared - 1988.

- AVON TRAIL
- BRUCE TRAIL
- ▨ GRAND VALLEY TRAIL
- GUELPH RADIAL LINE TRAIL
- ▨ MERRITT TRAIL
- △ SPEED RIVER TRAIL
- THAMES VALLEY TRAIL
- WELLAND FEEDER TRAIL
- BRANCTON RAIL LINE
- C.P.R. RAIL LINE



Development Stresses in the Grand River Valley

Andrew Skibicki and Derrick Hammond



CONTEXT

The purpose of this report is to describe development stresses that have known or potentially undesirable effects on the continued use and conservation of the natural, human and recreational heritage resources of the Grand River valley. Stresses are seen as land use or other changes which may result from the development or alteration of the natural environment by man.

Development has, in the past two centuries, become an integral part of the landscape of the Grand River valley. The policies of regional, county and municipal governments have done much over the years to promote growth and its associated economic benefits, while protecting important features of the heritage landscape. However, an increase in the rates of growth of most urban areas in the valley over the last few years has put increasing stress on most heritage resources, raising the need for some strategy of sustainable development. A strategy of sustainable development, as envisioned by such organizations as The World Commission on Environment and Development, would ensure that economic development would meet the needs of present and future generations without compromising heritage resources (WCED: 1987).

The following discussion describes and analyzes the various types of development stress present in the valley and outlines a number of management issues needing to be addressed in planning any form of heritage management in the Grand River area.

Although often the basis for greater human well-being, man-induced development can have a number of deleterious effects on natural, human and recreational heritage resources. The areas in the valley where development stresses are the most concentrated are in the growing urban centres. The industrial, commercial and residential activities of these areas are placing increasing demands on the resources of the valley. Lesser concentrations of man-related stress activity are found in rural areas where certain farming practices, such as the use of pesticides and herbicides on crops and the drainage of rural wetlands, pose stresses mainly on the natural heritage of the valley.

In urban regions, specifically, industrial areas place stresses on heritage resources by the regular emission of pollutants into the atmosphere or into the water cycle. The effects of these emissions may include the impairment of air and water quality, which may have further consequences on wildlife and recreationists. There is also the additional threat of an accidental release of hazardous substances by such industries.

Commercial and residential urban areas place stresses on natural heritage resources by the removal or disruption of large tracts of soil and vegetation. If such development is located in proximity to a stream or river channel, there are implications for increased erosion and soil instability. Surface runoff is increased with the replacement of natural cover by asphalt and housing. As a result, the likelihood of contamination and sedimentation of nearby waterways is increased. Human heritage impacts from commercial and residential development include the threat of destruction to historically and architecturally significant structures and their associated cultural, educational, and economic values. Also, the disruption of the natural aesthetic qualities of the riverine environment may have negative impacts for recreational users.

Other development stress activities generated by urban growth include sewage treatment, landfill facilities, roads and hydro/utility transmission corridors.

Sewage treatment operations discharge oxygen-demanding effluent which depletes a river's oxygen supply. Industrial and municipal landfill sites may contain hazardous

substances which could pose a threat to river quality if leaching occurs. Such facilities and sites may also degrade the aesthetic qualities of the surrounding areas. Further, these growing urban areas have increased water supply demands which may lead to the construction of additional control structures, such as dams or weirs, on the river. These structures can have positive aspects in creating new habitats for wildlife, but may also have negative impacts on migration of some fish species, can hinder canoeists, and can create large areas of still water along the river that can change its nature (i.e. temperature and ecosystem structure). Other development stress activities generated by urban growth include hydro/transmission corridors that prevent the free migration of wildlife species, destroy the natural scenic appearance of the river, and can cut across ESAs thereby disturbing delicate ecosystems.

Development stresses in rural areas include runoff from farming operations containing high concentrations of fertilizer, herbicides and insecticides. As farming operations become more chemical-dependent in the future, this threat to the environment of the river system will grow. Many farming operations are also responsible for increasing stream bank erosion, increasing sewage pollution entering a river from livestock operations, clearing large areas of woodland, and draining valuable wetland environs. Aggregate extraction sites, mostly located in rural areas, have the potential of disrupting drainage patterns and increasing soil erosion.

As can be seen, the development stresses impacting on natural, human and recreational heritage resources are numerous, specifically in the highly developed urban centres in the Grand River valley.

Some research has been performed to understand such environmental stress (Francis *et al.*; Dufour and Desay). Research in the Saguenay region of Quebec was found to be most useful as it focused on a river corridor (Dufour and Desay, 1987). A slightly modified version of this work was chosen for the Patterns Maps section of this study.

The Saguenay study mapped numerous development stresses such as toxic waste sites, landfill sites, clear-cut logging areas, major industrial zones, mineral and aggregate sites, dams, hydroelectric sites and corridors, airports and source areas for water pollution. Our use of this methodology excluded the mapping of river water quality, military bases, parks, conservation areas, recreation/cultural activities, and other uses, some of which are examined in other sections of this Grand River Heritage Study. The Saguenay researchers chose to display environmental stresses in a map format because they felt that it was an "excellent medium to display the relationships between phenomena and their cultural impacts" (Dufour and Desay, 1987:2).

Our mapping followed a design technique utilized by Hans-Bastedo in her study of the cultural aspects of resource surveys in Aishihik, Yukon (Hans-Bastedo, 1983; Grigoriev *et al.*, 1985). This mapping technique was chosen because it furnished our study with a method of mapping stress nodes and corridors in a manner which presented the greatest amount of information clearly as well as allowing for the spatial distribution of development stress nodes to be shown. The technique allowed us to relay to the reader the relative intensity and growth over time of a development stress node. Intensity may be defined as the relative amount of stress being generated over a period of time.

PATTERNS

With the aforementioned definition of development stress in mind, our research set out to identify development activities which would pose stress on natural, human and

recreational heritage resources along the Grand River. Hence, data were collected to identify zones of residential or subdivision expansion, industrial areas, sewage treatment facilities, water withdrawal operations, major waste dump sites, dams, weirs, bridges, transportation corridors, airports, licensed pits and quarries, pipelines, and hydroelectric corridors. All of these may be included in the broad category of development stress.

Development stress activities associated with farming operations in rural areas were not mapped due to the vast number of farms in existence in the valley and the lack of a reliable method of determining which farms are generating which stresses.

Stresses identified as residential, industrial, and licensed pits and quarries were further classified in accordance with the scale (relative size) and intensity (amount of stress generation over a period of time) of the activity. These data are graphically displayed in Figure 1, "Development Stress".

Given the array and complexity of stresses in Figure 1, a fundamental decision was made to create a stress nodes and corridors map. This map is intended to aid the reader in interpreting the types and levels of stress activity found in the valley. Stress areas were grouped into a systematic arrangement of nodes and corridors and presented in Figure 2, "Development Stress Nodes-Corridors". The identification of these nodes/corridors as having zones of primary, secondary, or tertiary stress intensity, and as having unique growth characteristics, is based on development patterns indicated in: (i) the official plans of various regional municipalities, counties and municipalities; (ii) planning appraisal studies done for various municipalities; (iii) local news releases on development in an area; and (iv) general observations and field checks made by the researchers.

In Figure 2, the distribution of development stress in the Grand River watershed is shown. As identified on the map, primary intensity stress nodes with increasing future growth characteristics exist in and around the cities of Guelph, Waterloo, Kitchener, Cambridge, and Brantford. All high intensity stress nodes in the valley show increasing growth characteristics, meaning they will continue to pose a high level of stress to the valley in the future.

Only one primary level intensity stress corridor is identified on the map. This is the Highway 401 corridor passing through the centre of the valley. It was identified as a primary level stress corridor because of the high amount of traffic and transport activity occurring, thus giving it a high stress relationship with the surrounding environment.

Secondary level intensity stress nodes exist in the Fergus-Elora area, in and around the town of Elmira, and in the vicinity of Paris and Port Maitland. According to the Official Plans of these communities, these secondary nodes show a consistent or steady level of future growth, except for the Fergus-Elora area, which is exhibiting a more positive rate of growth.

Secondary level intensity stress corridors are mostly automobile routes servicing primary level node areas in the central region of the valley. These routes are Highway 24 (linking the cities of Guelph and Cambridge), Highway 8 (linking the cities of Kitchener and Cambridge), Highway 7 (linking Guelph and Kitchener), Highway 24 (linking Cambridge and Brantford), Highway 403 (running through Brantford) and Highway 7-8 (linking Kitchener-Waterloo with Stratford). All secondary level corridors show a slow level of future growth except for Highway 7-8, which is expected to be expanded in the near future.

Tertiary intensity stress nodes are identified in and around Grand Valley, New Hamburg, Caledonia, Cayuga, and Dunnville. All of these nodes show a slow level of future growth.

Tertiary intensity stress corridors are found mainly along automobile routes linking primary urban nodes with non-primary nodes. These are Highway 6 (linking Fergus with Guelph), Highway 85 (linking Waterloo with Elmira), Highway 86 (linking Guelph with Elmira), and Highway 54 (linking Brantford with communities further downstream). All tertiary intensity corridors show a slow level of future growth except for Highway 86, which is expected to be expanded in the near future.

For a more detailed description of these development stress areas, refer to Appendix I.

SIGNIFICANCE

Development stress nodes and corridors were identified based on their level of significance in implementing any form of heritage planning. This information is shown on Figure 3, "Significant Development Stresses."

Significance of a stress node/corridor was based on the researchers' perceived knowledge of impact on heritage resources in the area. This impact may be in the form of (i) a strong level of pollution of air, and/or water; (ii) the extent of tree and vegetation clearing; (iii) negative impacts on scenery and/or aesthetics; (iv) strong disruption of soil; (v) the disturbance and/or destruction of wildlife; and (vi) the disturbance and/or destruction of heritage structures.

Four nodes of primary stress significance are identified on Figure 3, "Significant Development Stresses."

The most significant appears to be the Hidden Valley-North Cambridge node. In the Hidden Valley section of Kitchener, several Environmentally Sensitive Area (ESA) sites and geologic features are being impacted upon by rapid industrial, commercial and residential expansion. The proposed water recharge project to be located in this valley will initiate the construction of a weir and holding reservoir on the Grand River. This may add a further obstacle to canoeists and perhaps change the ecological nature of the river in this section from a flowing stream to a relatively slow-moving holding reservoir. In terms of recreation, rapid industrial, commercial and residential growth is impacting on the aesthetic natural beauty of Hidden Valley, an attribute held in high regard by many local residents and passive recreationists. Urban development is also having effects on the aesthetic resources of Pioneer Tower, a well-known cultural landmark in Hidden Valley. The North Cambridge area is experiencing one of the highest levels of industrial and residential growth in the valley. This expansion may lead to the construction of additional transport corridors, bridges, and other support structures in this area, thus putting additional stress on the environment.

The second most significant stress node exists along the Grand River in the city of Brantford. This zone was classified as a high significance node due to the high levels of development that have occurred in this area and their potentially negative environmental impacts on the river. The large extraction operations located to the west of the city make for a significant impact on the water table. The recent purchase of these lands by the city for rehabilitation and eventual industrial use will make industrial impacts the main ecological threat here. New industrial lands close to the river have also been purchased in

the southeast section of the city but have yet to be developed. Further environmental and recreational stresses are put on the river by two major weirs located next to the Brant Conservation Area which serve as holding structures for the city's water treatment plant. The environmental threat is the greatest along the oxbow stretch of the river. This area not only contains a sewage treatment plant, which is below the maximum observed floodline, but also many scattered older waste deposit sites. These operations may also have a scenic impact on several important historic and cultural sites located near the oxbow such as the Mohawk Chapel and the Woodland Indian Cultural Education Centre and Museum. River bank erosion is occurring at several locations within this node and adding to the sediment load of the river. The most significant levels of erosion are occurring along Colborne Street.

The third highest significant stress node exists in the southern section of the city of Guelph. High levels of industrial and residential development in the vicinity of the Hanlon Industrial Park are placing environmental stress on several major ESAs such as Hanlon Creek, Speed River South, and Hall's Pond. These developments are also placing stress on the recreational and human heritage of this area.

The fourth highest significant stress node is identified as the city of Waterloo. Rapid residential expansion to the west of the city is encroaching on several ESAs. Large scale industrial and residential expansion is also occurring to the northeast in close proximity to the Grand River. Several small tributary streams within Waterloo, such as Laurel Creek and Maple Hill Creek, are coming under increasing development stress. Sections of Maple Hill Creek have been turned into concrete channels to control flooding problems in the residential areas through which it flows. Laurel Creek has been significantly altered in the downtown section of the city and recent discoveries have been made that point to significant levels of industrial waste contamination of the creek from past industrial activities. Much of the Grand River passes through private property holdings in this and other areas. This may inhibit public access for passive recreational enjoyment in some areas.

Seven nodes of secondary stress significance are identified. These nodes also impose stress on natural, human and recreational heritage resources, but their effects and intensity are less significant.

The Elora-Fergus node represents stress on natural, human, and recreational heritage. The key impact on the natural environment of the river in this area comes from residential development between and in Elora and Fergus. As well as having a possible natural impact, this residential development may constrain recreational enjoyment on the river and public access at various points. Industrial development around these two urban centres may only represent a moderate threat to nature and aesthetics due to Elora's policy of allowing only light industrial activity within its boundaries, and the concurrent low level of industrial activity in the north of Fergus. The threat to human heritage structures is also low since they form an important element of the local tourist economy and consequently are more likely to be managed well.

The node at Elmira is classified as a secondary stress area because of the high potential for contamination its industries pose to the water quality of the river.

Significant stresses are being placed on human and natural heritage in the Cambridge (Galt) node. Impacts on the natural environment include extensive modification of the river channel in that area through dredging of the bed of the river, dyking and increased residential development activity along the banks of the river. In addition, residential expansion may threaten to degrade several ESA sites located to the

west of the city, and limit public access to unique geologic features associated with the river bank.

A secondary level node of stress has been identified north of the village of Ayr. This area was selected as a secondary significant stress site due to the high level of aggregate extraction activity occurring and its relatively close proximity to a large number of regionally significant ESA sites.

Town of Paris exhibited stress of the same scale and type as Elora-Fergus with respect to residential and commercial activity. However, industrial activity is of a higher scale and intensity here than that found in Elora-Fergus. This can be determined by the large aggregate extraction operations to be found to the north, east, south-east and west of the town. Development stresses also occur on the Nith and Grand Rivers as they flow through the centre of the town, due to the close proximity of many structures. Further, the Nith river flows near a major landfill site located to the west of Paris.

The final secondary stress node is located at the mouth of the Grand River near Dunnville-Port Maitland. Problems in disposing of the waste products and emissions generated by the International Minerals and Chemicals plant pose a direct stress to the wetlands of the river in this area as well as its attractiveness for recreational users. This node was classified as a secondary significant site and not as a node of primary significance solely on the basis that the industry located here is not expanding very quickly and can be readily identified and possibly easier to control in the long run. Also, the stress generated in this area may decrease in the future due to increased pressure to develop recreation-based activities (Veale, Oct. 25, 1988).

CONSTRAINTS

The purpose of this section is to map and describe development stress nodes and corridors along a compatibility spectrum with respect to heritage features and processes. Three categories are presented in this spectrum: compatibility, tension, and conflict.

The criteria used to determine whether an area is a zone of compatibility, tension, or conflict were: (i) the nature of policy planning in the area; (ii) the intensity of a stress activity; (iii) the spatial extent of a stress activity; (iv) the level of urban growth; and (v) the level of economic growth.

A **compatible zone** is defined as a node or corridor where development is in general harmony with human, natural and recreational heritage resources either because changes in governing policy, intensity of stress activity, spatial extent of such activity, low urban or economic growth, or other criteria are currently occurring; or because such changes have occurred and stabilized (Nelson *et al.*, 1984).

A **tension zone** is defined as a node or corridor where the intensity and/or spatial extent of a stress activity is in evidence; there is a steady increase in the rate of urban or economic growth; policies that may threaten the stability of a heritage resource exist; or other criteria are in evidence.

A **conflict zone** is defined as a node or corridor where major changes in the aforementioned criteria are occurring and the relationships between stresses and heritage resources are changing, with implications for the quality and integrity of those resources.

Figure 4, "Development Stress Constraints", outlines the major zones of compatibility, tension and conflict.

Three key zones of stress conflict are identified: (i) Waterloo-Kitchener-Cambridge; (ii) Guelph; and (iii) Brantford.

Rapid industrial, residential and commercial growth and expansion in the Waterloo-Kitchener-Cambridge and Guelph zones put numerous pressures on human, natural and recreational resources in these areas. Increased growth, of a scale not foreseen or adequately planned for by a region, can quickly outdate many official land use policies and force the region to make rapid adjustments on certain policy issues, including heritage, to accommodate the uncontrolled growth. These frequent instabilities in set policy statements and goals often make it difficult to plan heritage conservation schemes in these areas.

The third conflict zone, Brantford, represents an area of older, firmly established land use stress related to the river. Relative to the two previously mentioned zones, Brantford has had a longer history of land use conflict related to the Grand River. Over this period of time official city environmental policies have changed considerably, leaving Brantford to struggle with past offences committed against the river in areas such as the oxbow. Evidence of this comes from the large number of old landfill sites located on the oxbow.

Zones of tension are located at: (i) Elora-Fergus; (ii) Elmira; (iii) North Dumfries-South Dumfries; (iv) Paris; and (v) Caledonia-Port Maitland.

In the zone of Elora-Fergus, tension on heritage resources is evident in increased residential expansion close to the river and increased economic activity. Although urban activity has strong impacts on the river system in this area, the policies undertaken by the local governments recognize the intrinsic importance of heritage resources to the local economy, and measures have been taken to preserve these resources.

The significant level of environmentally hazardous industrial activity in Elmira serves to classify this area as a tension zone. Although industries here have undertaken strong measures to prevent accidental spillage or leakage of toxic substances into the environment, the potential for accidental contamination still exists.

Tension is also evident in the North Dumfries-South Dumfries zone. This relatively little developed corridor is experiencing strong development pressures from high development nodes located to the north and south. As determined earlier on in this study, this area contains one of the most significant assemblages of ESA sites in the valley.

Paris continues to be recognizing the economic benefits of heritage and taking steps to accentuate this resource and increase tourism within its borders. The potential for stress generation on heritage features associated with the river still exists in this area due to significant levels of urban development close to the river channel.

The Caledonia-Port Maitland stretch of the Grand River is being considered by local governments for tourism and navigation development. Another zone of tension exists in the Port Maitland area. The industry located here, International Minerals and Chemicals, forms such an important element of the local economy that local policies to protect the environment may, at times, give way to maintain the economic viability of this industry (Dunnville, 1982).

MANAGEMENT ISSUES

The most significant stress areas identified in our study are the major urban centres of the valley. These areas are experiencing the greatest levels of industrial, commercial, and residential growth which can impact on heritage resources and thus generate the greatest number of management issues that need to be addressed.

Major management issues in urban areas include:

- 1) The ability of urban centres to accommodate and preserve significant human, natural, and recreational heritage resources in their planning strategies while maintaining a healthy level of economic growth. In this case, there is the possibility of applying the concept of sustainable development, as envisioned by the World Commission on Environment and Development and others, for preserving heritage resources in the Grand River valley (WCED, 1987).
- 2) The willingness of urban centres to co-operate with other urban areas, agencies and levels of government in developing some form of linear recreation corridor along the river.
- 3) The ability and willingness of urban areas, agencies and levels of government to provide adequate staffing for heritage conservation.
- 4) Economic development plans by several municipalities below the city of Brantford to reopen the Grand River for navigation.
- 5) How existing or potentially stressed areas can be changed to zones of compatibility.
- 6) The degree of public access to the Grand River and its tributaries for passive and active recreation.
- 7) The possible need for increased education of government decision makers and urban landowners to the benefits, economic and otherwise, of heritage resources.
- 8) The impacts of sewage treatment facilities, landfill sites, and industries on water quality and recreation.
- 9) Problems of increased stream bank erosion and resultant increased sediment load in the river due to residential, commercial and industrial development close to the river.
- 10) The impact of water withdrawal operations, water control structures, bridges, and transportation corridors on the riverine environment and river-related recreation.

Major management issues in rural areas include:

- 1) Public access to the Grand River and its tributaries for passive and active recreational enjoyment.

- 2) Inter-agency, inter-government and public landowner co-operation in designing a heritage policy for rural areas.
- 3) Impacts of certain farming practices on river water quality and stream bank erosion.
- 4) The possible need for increased education of rural people and landowners to the benefits, economic and otherwise, of heritage resources.
- 5) Land use strategies for the rehabilitation of aggregate extraction sites.
- 6) The location of new aggregate extraction operations in relation to identified sites of heritage significance, such as ESAs and certain geologic formations.

General management issues:

- 1) What are the boundaries of any Grand River heritage river corridor?
- 2) Which development stresses in the valley have a major impact on the river corridor and which do not?
- 3) What are the possibilities of utilizing abandoned development corridors or sites, such as railway lines or concentrations of aggregate extraction sites, for heritage or recreation purposes?

COMMENTS

No major problems were encountered in mapping development stress areas in the Grand River valley. However, since this is the first inventory of development stress for the whole basin, the related lack of stated criteria to identify stress nodes/corridors in terms of their significance and constraints, forced the researchers to design their own criteria based on general knowledge of stress in the valley. It must be noted, then, that these criteria are by no means definitive. Further studies may be needed in specific areas to identify the nature of some stresses.

Appendix

AREA SPECIFICS

County of Dufferin

The County of Dufferin, located in the uppermost section of the Grand River basin, has a landscape and economy that is mainly rural in nature. The only major urbanized area is the town of Grand Valley.

Industries:

Industries and commercial uses that are directed to the travelling public and the farming community are the only ones permitted in the town of Grand Valley as stated by East Luther Township in its official plan. These include piggeries and poultry uses which may pose water quality stress on their location relative to the Grand River and its tributaries. The major industrial activity in the rural areas besides farming is aggregate extraction.

Residential and Commercial:

The town of Grand Valley has the highest concentration of residential activity in the Grand River basin portion of Dufferin County although, relative to other parts of the basin, development stress here is small. These housing areas are mostly classified as low density estate residential.

Licensed Aggregate Extraction Activity, Sewage Treatment Plants and Waste Dump Sites:

Small levels of licensed aggregate extraction are occurring in this region. One operation is located about one mile west of Grand Valley. The town of Grand Valley has one major sewage treatment facility. No major dump sites, with possible stresses on the Grand River system, are located in this area.

Dams/Weirs and Transportation Corridors:

One major dam is located in this area. This is the Luther Dam which serves as the holding structure for the Luther Lake reservoir. Three major highways run through this area. These are the King's Highways 9, 25 and 89. Several railway lines run across this region along a west-east corridor.

County of Wellington

The main economic base of Wellington County is also agricultural. The villages of Elora, Arthur and Drayton and the town of Fergus represent economic centres of light industrial activity and moderate residential and commercial. The city of Guelph represents a node of heavy residential, commercial and industrial activity on the scale present in Kitchener, Waterloo, and Cambridge. In 1987, Guelph experienced the highest levels of industrial growth in the basin (K-W Record, May 13, 1988).

Industries:

The highest intensity and greatest expansion of industrial activity is occurring in the North West Industrial Basin, the York-Watson Industrial Park, and the Hanlon Industrial Park (County of Wellington-City of Guelph, 1983). The Hanlon Industrial Park area, in the southwest section of the city, is located in very close proximity to several ESPAs identified within Guelph (Hanlon Creek, Speed River South, and Hall's Pond). Light industrial activity with increasing growth is in evidence in Elora and Fergus. This situation is expected to continue in Elora which, according to its Official Plan, permits only light industries to locate within its limits. Most economic growth in these urban areas is geared towards manufacturing, agricultural support industries and tourism, an activity that is gaining increasing importance in Wellington County (Wellington County, 1986; K-W Record, May 6, 1988). Industrial growth in Fergus has stagnated over the years due to a lack of a variety of locations available along major routes such as Highway 6. Light industrial activity with consistent temporal characteristics exists in Arthur, Rockwood, and Drayton.

Residential and Commercial:

The greatest levels of residential expansion are occurring in the northeast and south of the city of Guelph. Elora has experienced marginal but steady population growth closely tied to its low level of industrial growth, a trend that is likely to continue into the future. However, increased housing development has occurred on the fringes of the village due to Elora's increasing status as a "bedroom" community (i.e. a place of residence for people employed in other urban centres such as Guelph, Kitchener-Waterloo, and Fergus). The level of residential construction between Elora and Fergus is also increasing and demands a greater level of development control through planning. Fergus has had problems of scattered, unserviced residential growth occurring to the east in West Garafraxa and to the northwest in Nichol Township (Fergus, 1970).

Licensed Aggregate Extraction Activity, Sewage Treatment Plants and Waste Dump Sites:

The main licensed aggregate extraction operations are located two miles south of Guelph in North Puslinch Township, four miles south of Elora in Pilkington Township, northeastern Maryborough Township, east of Lake Belwood in West Garafraxa, and along Highway 24 between Guelph and Rockwood in Eramosa Township. Sewage treatment facilities are located in Guelph, Elora, Fergus, and Arthur. Two major dumpsites are located along the west bank of Lake Belwood and in the northeast section of the city of Guelph. Currently, the county is considering potential areas for the establishment of a new landfill site.

Dams/Weirs and Transportation Corridors:

Major dams along the Grand River and its tributaries are located in this county. The Guelph Dam is located on the Speed River, the Shand Dam is located on the Grand River, and the Conestogo Dam is positioned on the Conestogo River. As well, four weirs are located in Fergus and Elora on the Grand River and several are found in the City of Guelph on the Speed River. Several low stress transportation corridors link the major urban centres of the county. These are Highways 86, 6, and 24. Highway 401 passes through the southeastern fringe of the county. Also present are several railway corridors running through Guelph, Elora and Fergus.

Regional Municipality of Waterloo

This region of the Grand River basin represents perhaps the highest level of man-related development in the watershed. Three major development stress nodes of high intensity and increasing temporal characteristics exist: (i) Waterloo; (ii) Kitchener; and (iii) Cambridge.

Industries:

Major industrial zones are located in the northern part of the city of Waterloo, the southern and southwestern part of the city of Kitchener, and the northern and north-eastern part of the city of Cambridge. Further growth and expansion of industries in these zones is expected to continue. This is indicated by land use zoning in the official plans of these cities and by the generally high level of economic growth in this region. Industrial growth may become the greatest in northern Cambridge. A major industrial area is also located in the town of Elmira which, although not of the scale of the other three other major sites, does place considerable environmental stress on the streams of the basin due to its storage of toxic chemicals (Kowalchuk, 1988).

Residential and Commercial:

The greatest levels of residential expansion are occurring in the north, northeast, and southwest of the city of Waterloo; west, southwest, and south of the city of Kitchener; and east, north, northwest, south and west of Cambridge. Moderate levels of residential expansion are occurring around the village of Ayr and around the town of Elmira. Residential expansion in northwest Waterloo is quickly encroaching on a number of regional Environmentally Sensitive Policy Areas.

Licensed Aggregate Extraction Activity, Sewage Treatment Plants and Waste Dump Sites:

The highest nodes of licensed extraction activity in the region are located about four to ten miles to the east and southwest of the city of Kitchener, slightly northeast of the city of Waterloo, and four to ten miles west of the city of Cambridge. There are ten major sewage treatment plants in the region: one in Elmira, one in St. Jacobs, one in Wellesley, one in Baden, one in New Hamburg, one in Waterloo, one in Kitchener, and three in Cambridge. All utilize an activated sludge technique to treat sewage waste except for the plants at St. Jacobs, Wellesley, and Baden, which utilize extended aeration, and the plant at New Hamburg, which is a waste stabilization pond (Palmer, 1978). All have performed adequately, although some problems have occurred in the ability of the facility at Elmira to handle waste owing to the low flow of the Canagagigue River (Kowalchuk, 1988). Six major waste dump sites are located within this region: one in Woolwich County, one each in the cities of Waterloo, Kitchener, and Cambridge, one in Ayr, and one along St. George Road in North Dumfries Township. The most direct threat to the water quality of the Grand River has come from the Woolwich landfill site, where concern over landfill leakage and contamination to the river has been high (Kowalchuk, 1988). Numerous industrial operations, active or inactive, have highly toxic waste holding areas also spread throughout the region.

Water Recharge System:

The proposed Mannheim water recharge system calls for the construction of a weir on the Grand River near the Hidden Valley area of Kitchener to act as a reservoir for a pumping station located nearby. The water would be transferred from the pumping station to an

advanced water treatment facility located ten kilometres away. The treated river water from this facility would be pumped into an underground aquifer 45 metres below the surface. From there it would be drawn up and stored in collection wells at the surface. The plan is to take 72 million litres a day from the river in 1991, 144 million litres a day by 2006 and 253 million litres a day in 2021. The project is expected to meet the Region's needs until 2036 (K-W Record: April 16, 1988).

There are expected to be several notable impacts on the Grand River from this project. The construction of a weir has generated concern from residents of the area about the level of destruction that may occur to the scenic beauty of the river flowing through Hidden Valley. The weir's presence may also change the ecosystem of the river in that area and thus may have an effect on various forms of aquatic life. The pumping station located next to the weir will be built partly on land classified as environmentally sensitive in Kitchener's Official Plan. The water demand of the project when finally built may require the development of a dam and reservoir further up the river near West Montrose (Pilkington, 1987). There have been concerns that this reservoir may flood parts of the Elora gorge located slightly further upstream. There are also concerns that the river may not have enough water to service the needs of the region in the future, due to the forecasts of a drier climate (K-W Record: July 9, 1988).

Dams/Weirs and Transportation Corridors:

A major dam is located on the Woolwich reservoir on the Canagagigue Creek. Smaller dams, such as Laurel Creek and Chicopee, are located along other minor tributaries to the Grand River. Numerous weirs are located along the Conestogo River south of Elmira and in the highly urbanized zones of Cambridge. The high levels of economic and industrial expansion in this region have been greatly aided by the most prominent transportation corridor running through the basin. Highway 401, the main artery for economic growth in the region, has been identified as a moderate stress node on the basis of the enormous amount of development stress activity it generates, the disruptive effect it has for wildlife migrations, and the potential it represents for environmental contamination from such things as accidental toxic spills. Many other major highway corridors extend from or link the major urban centres of the region. Some, like Highways 7-8 and 86, are being widened to accommodate greater traffic flow (K-W Record: July 14, 1988). Numerous railway corridors run across this region. Most are in a state of slow decline in operational use.

County of Brant

Industries:

The city of Brantford represents the major industrial node in the county. Four major industrial areas are located within Brantford. These are the Braneida Industrial Park, the Northwest Area, the Southwest Area, and the Old Industrial Area. Braneida Industrial Park, the largest area, is reaching a point where it is unable to accommodate additional large industries due to a shortage of large lots. The new industrial areas recently annexed by the city are intended to accommodate these industries, although both have major constraints associated with them which will hinder their initial growth in the future. The Northwest Area, purchased from TCG Materials, an extraction company, will need a new trunk route and demand high initial prices from industrial developers because of the high purchase cost of the area for the city. The Southwest Area will also need new trunk services and an access route to Highway 403. Only "light industry" will be permitted in this area due to its proximity to a proposed residential area. The Canal Basin Industrial District, an older site, is considered to be inappropriate for continued industrial development and is

being considered for alternative land uses related to core area revitalization (Walker and Associates, 1985). It must be noted that the city has put into effect an interim development control by-law in the area to allow for studies to be done to determine a course of action in developing new industrial and residential areas. The town of Paris, the only other major node of industrial activity, has an overall low rate of industrial growth. The Scott Avenue Industrial Area was the original locale for industries but is quickly running out of suitable land. New industrial expansion is expected to occur in the East Paris Pit area. The slow overall growth of most industries in Paris has only accentuated the importance of tourism to the economy of the town (Town of Paris, 1985).

Residential and Commercial:

Large scale residential growth has occurred in the east, north, and southwest of the city of Brantford. Residential activity in the Colborne Street area has accentuated high rates of erosion and soil instability along that section of the river. This loss of property may force this residential district to be re-zoned as a "Development Constraint Area". Commercial activities are being encouraged to locate in the core area of the city although large fringe shopping centres do exist. The town of Paris has a moderate rate of residential growth, with most growth occurring to the south and north. Fringe shopping centres are discouraged because of the threat they pose to core area businesses. A moderate level of stress is put on the Grand and Nith Rivers in the core area.

Licensed Aggregate Extraction Activity, Sewage Treatment Plants, and Waste Dump Sites:

Large extraction operations are located to the west of Brantford and to the north, east, and southeast of Paris. The TCG Materials operation in the Northwest Area has been purchased by the City of Brantford for industrial development and is scheduled to be worked out by 1988 (Walker and Associates, 1985). Sewage treatment plants are located in Paris and Brantford. Many old landfill sites are located in the oxbow of the Grand River; as well, one landfill site is located to the west of Paris.

Dams/Weirs and Transportation Corridors:

Two major weirs are located on the Grand River near Brantford. They are the Wilkes and Lorne Dams. One major weir is also located in Paris on the Grand River. Major transportation routes crossing the county include Highways 2, 24, 24A, 54 and 403, the Lake Erie and Northern Electric Railroad and the CNR railway.

Regional Municipality of Haldimand-Norfolk

This region represents a relatively low level of development stress due to its low level of economic growth. Lack of major local markets and the distance to a major transportation route have been an important factor in this region's slow rate of economic growth (Haldimand-Norfolk; Underwood, McLellan and Associates Ltd., 1977).

Industrial:

The major industrial influences on this area are located outside the Grand basin. These are the Nanticoke industrial development and the industries situated in the Golden Horseshoe around Hamilton. Urban areas such as Caledonia, Cayuga, and York tend mostly to serve these industrial sites as "bedroom" communities and have tended to exhibit low levels of industrial development within themselves. However, notable industrial developments placing stress on the Grand River system do exist and include the large

mining facility located north of Caledonia and the industries located at the mouth of the Grand River in Port Maitland.

Residential and Commercial:

Residential and commercial growth activity is low in the region, a trend likely to continue into the future. Tourism is being considered as an attractive economic alternative but may demand a large initial financial investment if it is to grow. This is due to the low numbers of tourist-related establishments (i.e. motels, hotels, etc.) in evidence in the urban areas.

Licensed Aggregate Extraction Activity, Sewage Treatment Plants, and Waste Dump Sites:

The only high level of extraction is occurring north of Caledonia. Another operation is in evidence west of Dunnville. The areas west of Cayuga represent a region of high aggregate extraction potential as mapped by the Ministry of Natural Resources. If the extraction industry ever revives in this region, these lands would become prime locations for new extraction operations. Sewage treatment facilities exist on the Grand River in Caledonia, Cayuga, and Dunnville. All facilities are operating efficiently due to the high volume of river water available. Waste dump sites are located in most communities.

Dams/Weirs and Transportation Corridors:


















Major weirs are located in Caledonia and Dunnville on the Grand River. The major transportation corridor in this area of the basin is Highway 54. Also, the CNR railway runs from the Brantford area to Port Maitland.

Figure 1




GRAND RIVER HERITAGE STUDY




0 1 2 3 4 5 MILES
Date prepared - 1988.

DEVELOPMENT STRESS MAP

*  Residential/Commercial	 Dam
*  Industrial	 Weir
 Sewage Treatment Facility	 Proposed Dam/Weir
*  Licensed Pits & Quarries	 Major Automobile Bridge
 Major Waste Dump Sites	 Railway Bridge
 Water Withdraw Facilities	 Major Road/Highway
 Airport	 Gas Pipeline
	 Oil Pipeline
	 Railway Line
	 Power Line

* NOTE: Further classified under...

SCALE of the Activity:   

INTENSITY of the Activity:   

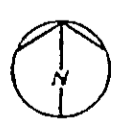
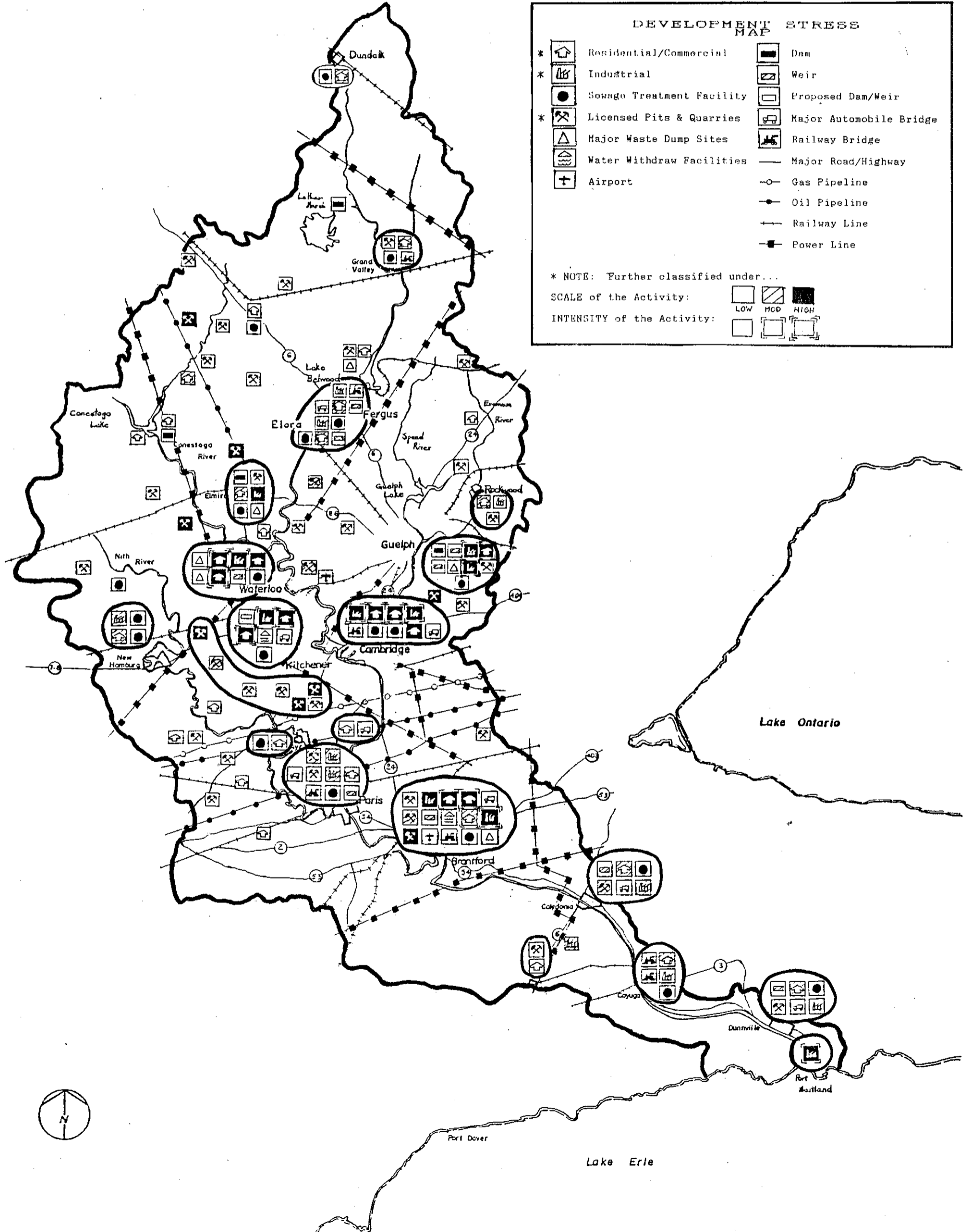


Figure 2

GRAND RIVER HERITAGE STUDY


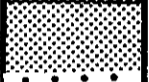

0 1 2 3 4 MILES 5
Date prepared - June, 1988.

**DEVELOPMENT STRESS
NODES-CORRIDORS**

TEMPORAL CHARACTERISTICS:

- Consistent
- - - - - Increasing
- - - - - Decreasing

INTENSITY OF STRESS:

-  Primary
-  Secondary
-  Tertiary

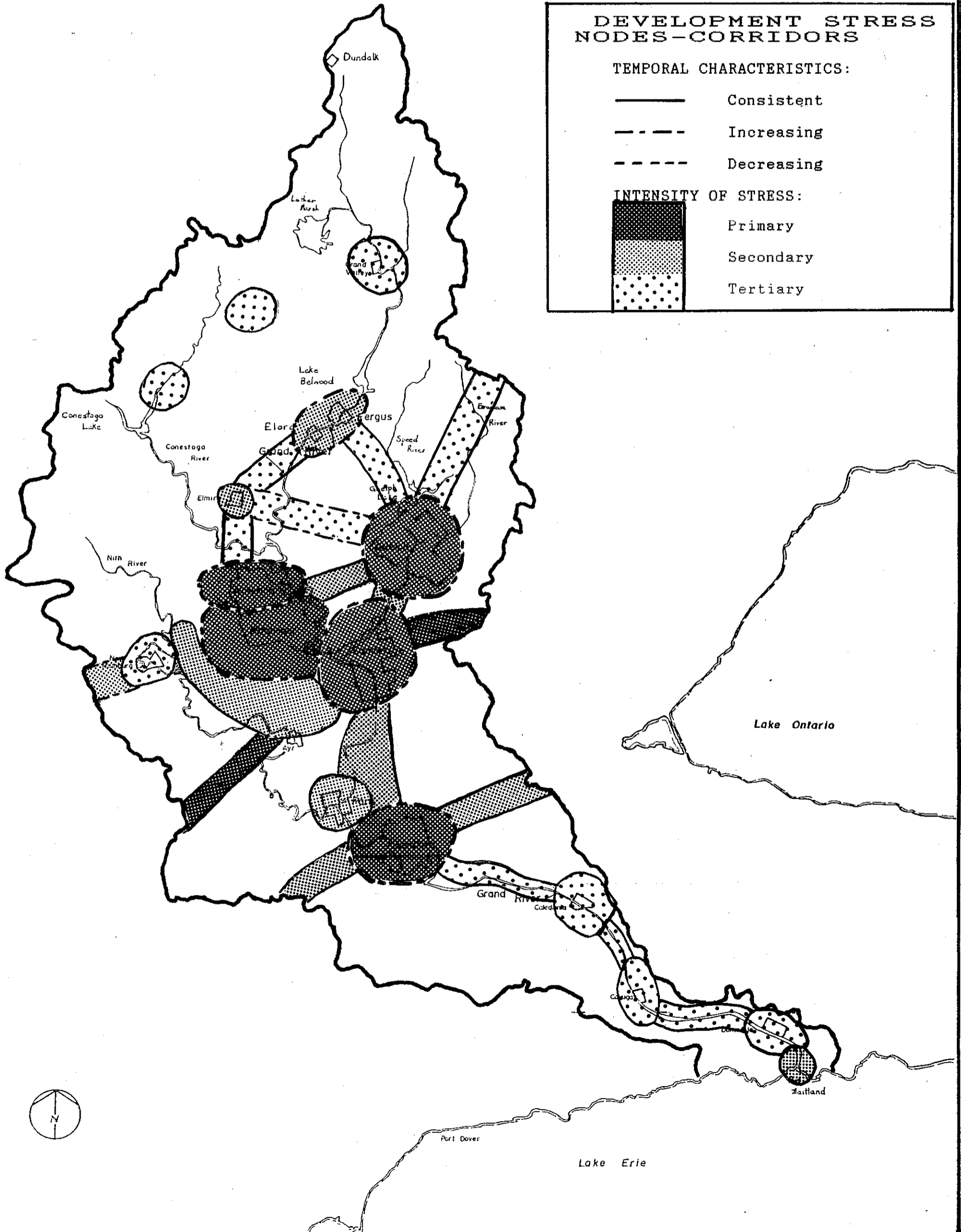



Figure 3

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5 6
Date prepared - Feb. 1988.

SIGNIFICANT DEVELOPMENT STRESSES



High Significance
Moderate Significance
Low Significance

IMPACTS ON:

- N Natural Heritage Resources
- H Human Heritage Resources
- R Recreational Resources

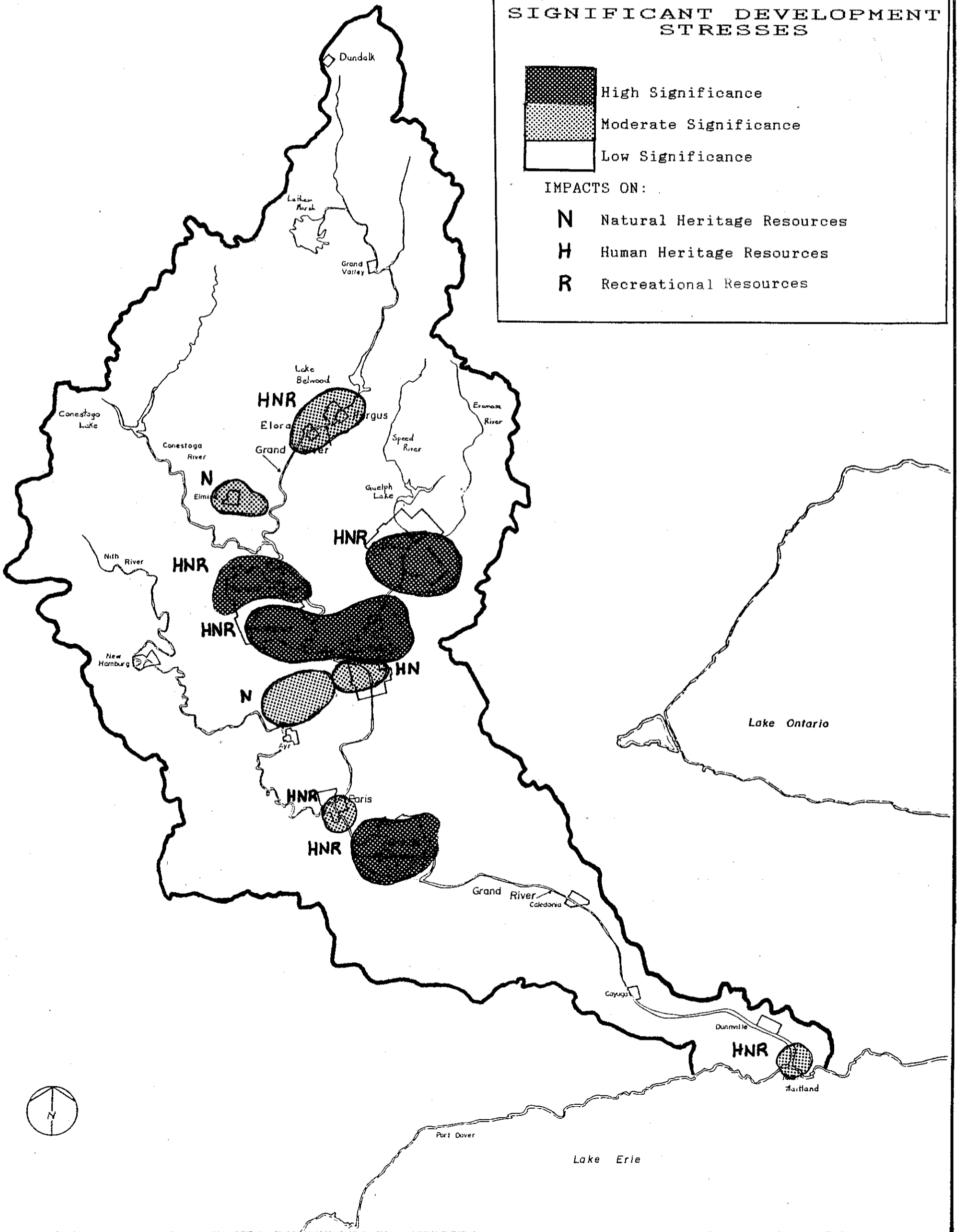





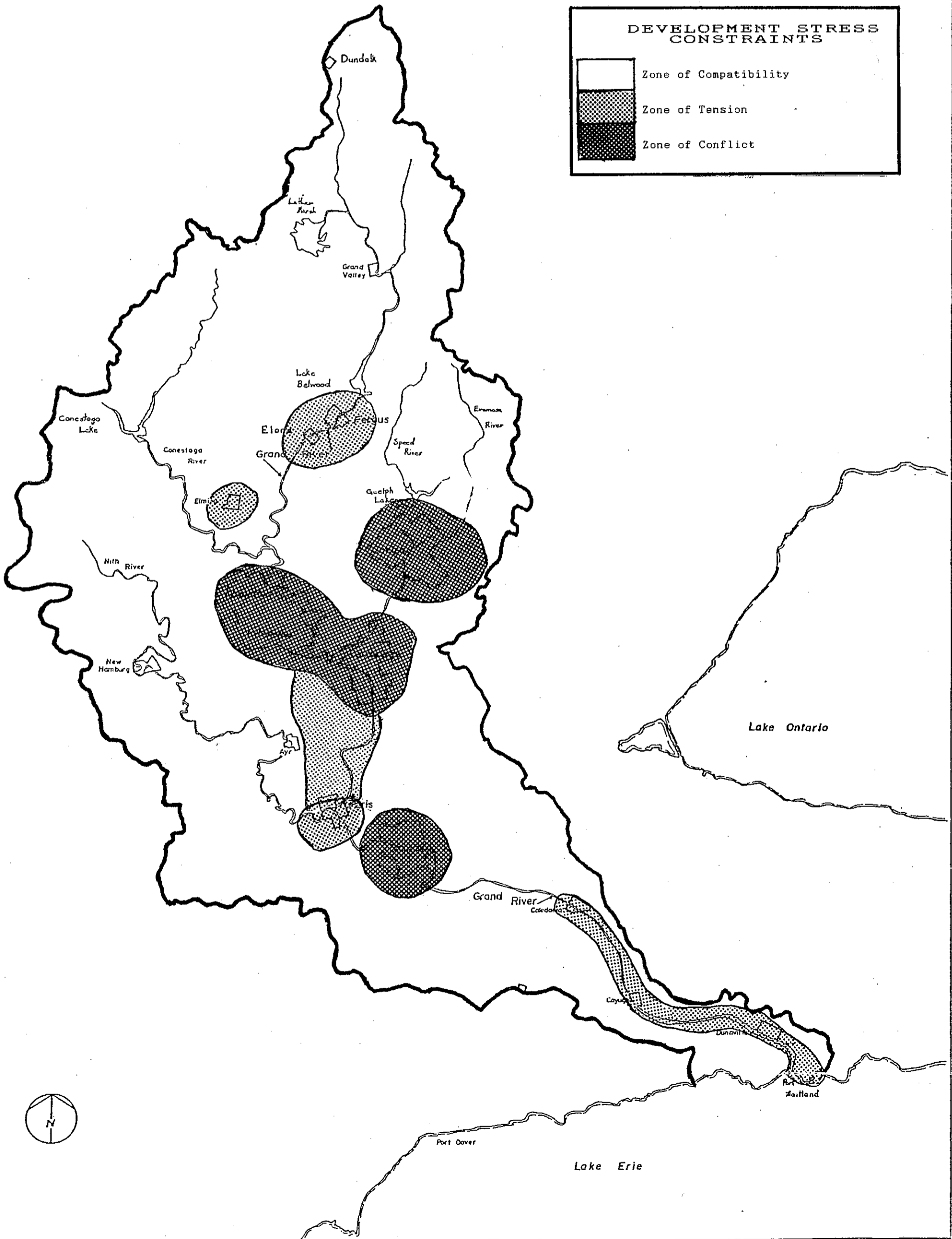
Figure 4

GRAND RIVER HERITAGE STUDY

0 1 2 3 4 MILES 5 6 7 8
Date prepared - AUG, 1988

DEVELOPMENT STRESS CONSTRAINTS

	Zone of Compatibility
	Zone of Tension
	Zone of Conflict



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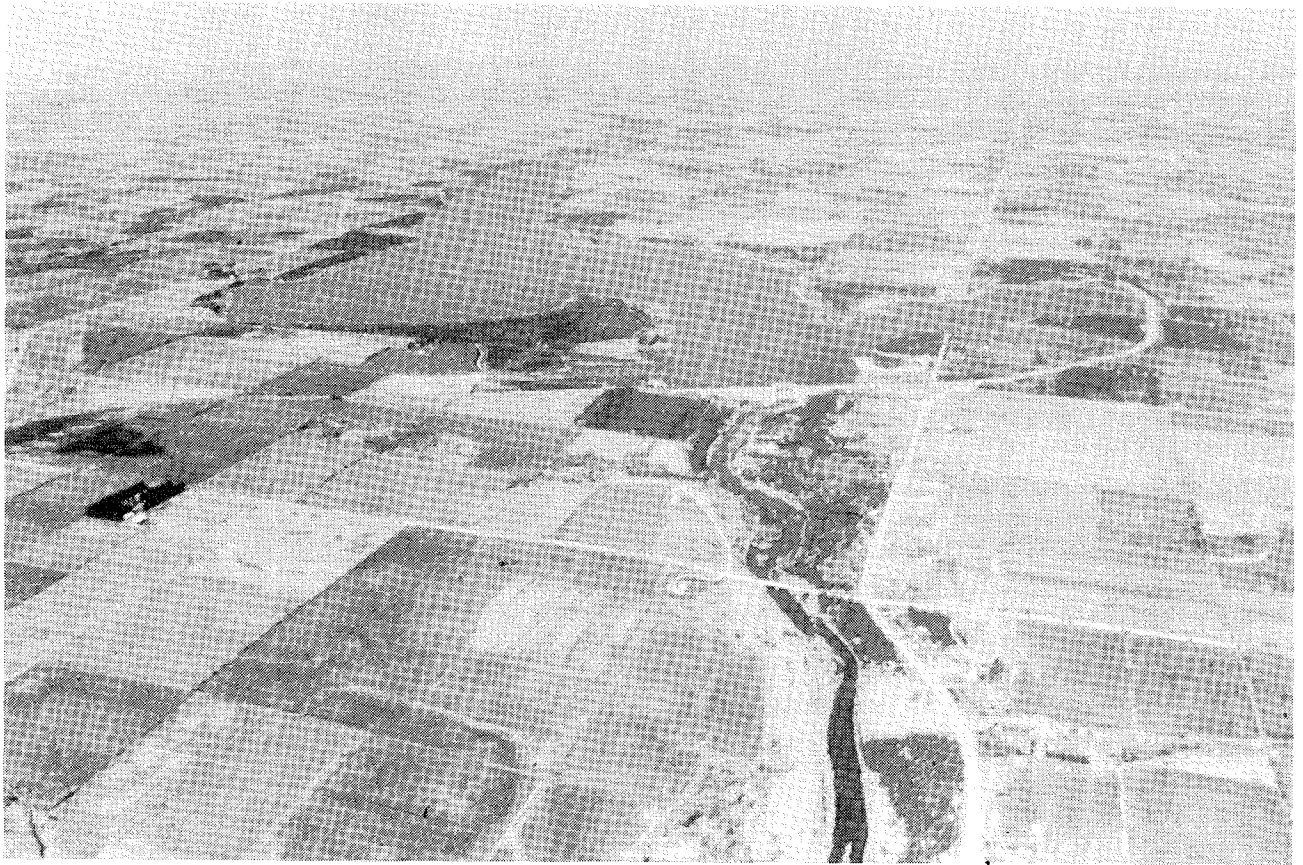
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Heritage Management Arrangements for the Grand River Valley

Derrick Hammond and Andrew Skibicki



CONTEXT

The purpose of this report is to describe and map the major management arrangements for the conservation and use of heritage resources in the Grand River valley. Information is presented on the more significant of these arrangements as well as on constraints on heritage planning and management. Issues associated with heritage planning and management are also identified for the valley. Management arrangements refer to forms of government, agencies and the legislation under which they operate, as well as other means of influencing human behaviour. The "other means" can include rules and regulations, penalties and performance standards, subsidies and taxes (Nelson, 1978: 48).

In the present context, given limited time and resources to prepare the report, the focus is on the roles of major agencies such as Indian and Northern Affairs Canada, the Canadian Parks Service, the Ministries of Culture and Communications, Environment, and Natural Resources, the Grand River Conservation Authority (GRCA), regional municipalities, and the area municipalities.

The essence of planning and management for the conservation and use of heritage resources is an appropriate set of management arrangements (Theberge *et al.*, 1980; Nelson and Jessen, 1981; Nelson and Jessen, 1984; Sadler, 1984; Grigoriew *et al.*, 1985; Bastedo, 1986; Kreutzwiser and Crichton, 1987; Mitchell, 1987). The Alsek, Clearwater, French and other rivers which have been previously designated as part of the Canadian Heritage Rivers System (CHRS), are located in sparsely populated areas, parks, or nature reserves and have simple and clear management systems (Figure 1). In contrast the Grand River has been settled, used and managed in many different ways for a long time and has a very complicated land use and management system which can pose problems for heritage planning and management.

PATTERNS

It was decided to begin with the identification and mapping of the major agencies operating within the valley. Only the agencies with major direct, as opposed to indirect, powers to influence heritage planning and management were mapped at this time. Direct powers refer to legal or regulatory based authority. Indirect powers may include funding research, providing technical assistance through allotting staff time or supplies, cooperation with other agencies, and public information and education programmes. These agencies were mapped on a basin or regional as well as a federal/provincial basis.

Although not much attention has yet been given to private stewardship, it is felt that this approach will be an important element in future management studies. The rationale for not including private stewardship in the present study is that the numerous privately owned areas could not be addressed well enough with available time and resources. This is a task for the planning phase of the Canadian Heritage River process for the Grand River.

Basin/Regional Management Arrangements in the Grand River Valley

Figure 2 shows the basin or regional level management arrangements which have some bearing on heritage planning and management in the valley. The map identifies four actors: i) the Grand River Conservation Authority (GRCA); ii) regional municipalities; iii) counties; and iv) the municipalities.

i) The GRCA has been delegated a range of powers under The Conservation Authorities Act (R.S.O. 1980, c.85), that relate to natural resources other than oil, gas and

coal. While involved in numerous resource related programs, the historical focus of the GRCA has been on water management through the operation of various water control structures on the river. The Authority regulates development in floodplains and some wetland and erosion prone areas through the administration of regulations pursuant to the Conservation Authorities Act pertaining to i) dumping or placing of fill in scheduled areas (Figure 3); ii) construction in a pond or swamp or in any area susceptible to flooding during a "Regional Storm"; iii) alteration to waterways. The Authority also owns approximately 18,071 hectares which are protected under the provisions of a separate regulation under the Act.

As a result of the Ontario Ministry of Natural Resources' delegation of Municipal Plan Input and Review responsibilities for floodplains (1983) and Great Lakes shorelines (1988) to conservation authorities, the GRCA has the opportunity to influence municipal planning decisions with respect to these resource management matters (Veale, 1988).

ii) Regional municipalities and counties have the power to delegate land use planning matters to area municipalities, as well as decide land use planning and other matters of regional scale. These management arrangements derive their powers from the Municipal Act (R.S.O. 1980, c.302) and the Planning Act (R.S.O. 1983, c.1). The responsibilities of regional municipalities include, among other things, water production and storage works, sewage treatment and solid waste facilities. In addition, regional municipalities may address the conservation and use of human and natural heritage with the Environmentally Sensitive Policy Areas (ESPAs) and heritage policies in their official plans.

An official plan is a document adopted by a municipal council and approved by the Minister of Municipal Affairs, delegated authority or the Ontario Municipal Board, containing objectives and policies established primarily to provide guidance for the physical development of a municipality while having regard to relevant social, economic and environmental matters.

iii) Area municipalities are important for heritage planning and management because they have been delegated, under the Municipal Act (R.S.O. 1980, c.302) and the Planning Act (R.S.O. 1983, c.1), powers to address matters of a local nature such as land use planning and human heritage (structures) protection. As in the case of regional municipalities, the principal mechanisms used to plan and manage for the conservation and use of heritage resources are official plans and the implementing zoning by-laws. The official plans of area municipalities must conform with those of the regional municipalities.

Federal/Provincial Management Arrangements in the Grand River Valley

Figure 4 shows the federal and provincial management arrangements bearing on heritage planning and management in the valley. The map identifies five actors: i) Indian and Northern Affairs Canada (INAC); ii) the Canadian Parks Service (CPS) of Environment Canada; iii) the Ontario Ministries of Culture and Communications (MCC); iv) Environment (MOE); and v) Natural Resources (MNR).

i) Indian and Northern Affairs Canada has powers that relate to two native people's reserves. These are the New Credit and Six Nations Reserves. These reserves, located in the proximity of Brantford, are officially considered to be subject to the provisions of the Indian Act (R.S.C. 1970, c.35). Hence, they are federal territories set aside for native people and are in large measure autonomous communities. In this sense, they are much like municipalities and address planning matters of a local nature.

ii) The Canadian Parks Service is more actively involved with the human as opposed to the natural and recreational heritage of the valley. This is through the operation of Woodside National Historic Park in Kitchener and the presence of numerous National Historic Sites in the valley. These management arrangements are provided for and subject to provisions in the National Parks Act (R.S.C. 1970, c.34) and the Parks Canada Policy (1979). While the historic park receives protective status under the Act and has a management plan, "the commemoration by a plaque or monument does not directly ensure the protection of historic sites" (Parks Canada, 1979: 15).

iii) The Ontario Ministry of Culture and Communications is directly involved in the planning and management of human heritage in the valley through the historic sites plaquing program of the Ontario Heritage Federation. As with the federal counterpart, these plaques do not directly ensure the protection of these sites. The Ontario Heritage Act (R.S.O. 1980, c.37) delegates responsibility for the protection of heritage structures to municipalities. The Act also provides for the formation of Local Architectural Conservation Advisory Committees (LACACs) which aid in the identification and protection of local heritage structures. The Act also provides for the planning and management of heritage districts as well as individual buildings or structures. This heritage district opportunity has not been used much in the Grand River area. Assistance with heritage planning and management generally is available through a national organization, the Heritage Canada Foundation.

iv) The Ontario Ministry of the Environment is active in the planning and management of natural heritage in the valley by the enforcement of water quality guidelines. While it is realized that, presently, these guidelines lack legislative or regulatory authority, the Municipal-Industrial Strategy for Abatement Program (MISA) is seeking to counter this. It is an aim of MISA to strengthen enforcement mechanisms, including the introduction of monitoring and effluent limits regulations under Section 136 of the Environmental Protection Act (R.S.O. 1980, c.14). Present guidelines base standards for effluent discharges on ambient water quality. MISA will seek to set its standards on as "at the pipe" strategy.

v) The purpose of the Ontario Ministry of Natural Resources is to provide opportunities for resources development and outdoor recreation for the continuous economic and social benefits of the people of Ontario and to manage, protect and conserve public lands and water (Yu and Veale, 1984: 4.21). OMNR is active in the planning and management of natural heritage in the valley by way of a variety of mechanisms, most notably through the administration of the Grand River Conservation Authority. The Conservation Authorities Act (R.S.O. 1980, c.85) provides the terms of reference and guidelines for the establishment and functioning of conservation authorities (Yu and Veale, 1984: 4.25). Also, OMNR operates Rock Point Provincial Park near Port Maitland. This park operates under the Provincial Parks Act (R.S.O. 1980, c.45) and has a management plan. OMNR is also responsible for arranging and administering forest and woodlot planning with private landowners under the Agreement Forest Program. Mapping of Agreement Forests has not been completed for this report mainly because of the large number of such areas and the complexity involved in their mapping.

OMNR also enforces Ontario Fishing Regulations which were established under the authority of the Federal Fisheries Act (R.S.C. 1970, c.35). Through this Act, OMNR can penalize those people who have carried out activities affecting fish habitat (Yu and Veale, 1984: 4.24). The Lakes and Rivers Improvement Act (R.S.O. 1980, c.229) provides for the use of waters of Ontario's lakes and rivers and regulates improvements of them. The Minister of Natural Resources has the authority to order the removal of any tree, refuse,

substance or matter deposited in a lake or river in a manner which, in his opinion, impairs the natural beauty of the water body (Yu and Veale, 1984: 4.24). Under this Act, the Minister is also empowered to regulate the construction and operation of water control structures on lakes and rivers.

OMNR is also manages numerous Crown lands in the valley. The Public Lands Act (R.S.O. 1980, c.413) regulates the disposition of Crown land and, under the Act, the Ministry exercises control over the placing of substances on public lands, whether or not they are covered by water. Although Ontario Hunting Regulations apply on public and private lands throughout the valley, they have not been mapped at this time. In addition to legislative and regulatory powers OMNR, in conjunction with the Ministry of Municipal Affairs, issues Provincial Policy Statements for resource matters which are of provincial interest. Under Section 3 of the Planning Act, all governments and agencies must have regard to these policy statements. To date, policy statements have been issued concerning floodplains and mineral aggregates. A draft statement was issued for wetlands in late 1988.

SIGNIFICANCE

The purpose of this section is to consider the significance of the foregoing agencies in terms of the means or tools they have their disposal for heritage planning and management. Significance refers to noteworthy tools or mechanisms employed by government which provide for the conservation and use of natural and human heritage resources and recreation in the Grand River valley. Figure 5 displays nine significant conservation tools or mechanisms, which are: i) native people's reserves; ii) Woodside National Historic Park; iii) federal and provincial Historic Sites and Monuments; iv) Rock Point Provincial Park, v) Provincial Water Quality Guidelines; vi) Provincial Fisheries Regulations; vii) Fill, Construction and Alteration to Waterways, Conservation Areas and other regulations and powers of the G.R.C.A.; viii) Environmentally Significant Area policies of local government; ix) heritage policies of local government.

i) The native peoples reserves near Brantford have historic and symbolic importance. These reserves are the oldest form of management arrangement in the valley. Established in 1784, they are over 200 years old. Increasingly the ability of the reserves to solve resource, social and other problems is under question by the indigenous people. These people favour the idea of more self-government as opposed to the present system. The reserves have much symbolic importance in that they are the last ties to native culture and the traditional way of life in the valley.

ii) Woodside National Historic Park, located in Kitchener, is the only national park found in the valley. It receives protective status under the National Parks Act (R.S.C. 1970, c.34) and has a management plan. This park has generally been accepted by the local populace as a favourable mechanism for the appropriate conservation and use of the heritage resource.

iii) With the establishment of the Federal Historic Sites and Monuments Act (R.S.C. 1970) in 1953 and the Ontario Archaeological and Historic Sites Protection Act in the late 1950s, the federal and provincial Historic Sites and Monuments systems have been in use for a long time. These management arrangements provide for the identification of a nationally or provincially significant site with a plaque or monument. While neither arrangement provides for the direct protection of a site, they do identify the site and seem to have been generally respected by the public.

iv) Rock Point Provincial Park, located near Port Maitland, is the only provincial park found in the valley. Rock Point, as do other provincial parks, provides people with numerous recreational experiences and enjoyment, as well as economic benefits for neighbouring communities. The Ontario parks system has zoning and management plan requirements to provide for the appropriate conservation and use of heritage resources in parks like Rock Point.

v) Provincial Water Quality Guidelines have much symbolic importance in that they are essential to meeting CHRS integrity guidelines. The present MOE guidelines for water quality were established in 1973, as an updated and expanded version of the Ontario Water Resources Commission's Policy Guidelines for Water Quality Control in the Province of Ontario established in 1967 (de Loe, 1988: 90). The water quality guidelines prevent pollution of water bodies to a certain extent. These guidelines continue to be updated (see the discussion on MISA in section 2.1 above).

vi) Provincial Fisheries Regulations were established in 1954 under the authority of the federal Fisheries Act (R.S.C. 1970, c.45). As mentioned, through the administration of this Act, OMNR can prosecute those people who have carried out activities affecting fish habitat (Yu and Veale, 1984: 4.24). These regulations will prove to be important in conjunction with water quality guidelines, in meeting CHRS integrity guidelines concerning water quality.

vii) Construction, Fill and Alteration to Waterways Regulation, R.R.O. 154/86 administered by the G.R.C.A. allows this agency to regulate any development within the floodplain or modifications to the river channel. The Conservation Areas Regulations, R.R.O. 293/88 and Conservation Area Management Plans of the GRCA offer protection to the natural heritage resources within the boundaries of the conservation areas. Conservation areas are frequented by numerous people who have a desire for nature appreciation and recreation opportunities and in this sense, they have had great success in social acceptance.

viii) Environmentally Sensitive Policy Area (ESPA) Policies or provisions in municipal, county, and regional municipal official plans are shown in Figure 4. While it is known which local governments have such provision in their official plans, more research is required to determine how they are defined and implemented and how effective they are. ESPAs were designed to identify and recognize local areas having some significant natural characteristics. ESPAs do not have any regulatory or legislative basis for protection.

ix) Heritage Policies of Local Government have a limited legislative basis for protection of human heritage under the Ontario Heritage Act (R.S.O. 1980, c.37). This Act states that a municipality may delay destruction of a heritage structure for up to 270 days. After this time, the structure may be destroyed. At present then, the protective capabilities of this conservation tool are limited, however, in the future they may be strengthened as a result of the current Ontario Heritage Review.

CONSTRAINTS

Figure 6 divides the management mosaic of the valley into three categories on the basis of compatibility. The three categories include compatibility, tension and conflict zones (Grigoriev *et al.*, 1985: 32). In compatible zones, the various management arrangements are considered to be in general harmony and do not conflict with one another. In tension zones, management goals and practices may be controversial but there is the likelihood

that an agreement may be reached which is suitable to all actors (Grigoriev *et al.*, 1985: 32). In conflict zones, management arrangements may overlap and there may be some disagreement.

In considering constraints on management, it is suggested that as the number of agencies or management arrangements present in a locality increases, the greater is the likelihood for tension. We have identified as tension zones, those areas where three or more agencies are present. Identification of tension zones has also been influenced by our knowledge of controversy in an area. Figure 5 shows that there are no zones of conflict currently present in the valley while there are six tension zones in the area.

Tension Zones

The first tension zone stretches from the mouth of the river to Brantford. The source of tension is emerging differences in approaches to land use development and conservation by native people and nearby local governments.

The next perceived tension zone extends from Paris to Waterloo in the north and includes Kitchener and Cambridge. The corridor between Paris and Cambridge is considered as a tension area because of emerging differences between certain user groups and governments who wish to continue traditional development of the land, and other users who are calling for more nature appreciation and conservation as well as an expansion of recreation opportunities.

The urban areas of the valley, Brantford, Paris, Cambridge, Kitchener, Waterloo, New Hamburg, Guelph and Elora and Fergus, all represent areas of tension as they have three or more different management arrangements in operation within their boundaries. In addition, there are numerous users in the urban areas and hence their desires in use of heritage resources are bound to conflict and eventually cause tension among managers and governments.

MANAGEMENT ISSUES

Research has shown that the management complexity in the basin is significant (Yu and Veale, 1984; Ward, 1986; Ward and Killam, 1987; Hammond, 1988). Now that there is general knowledge of the management arrangements that have a bearing on heritage planning and management, we need to determine their absolute efficiency and effectiveness. Future management studies will have to analyze the management arrangements highlighted as significant here, to determine their inherent strengths and weaknesses. Similarly, further research is required to determine the implications and utility of these arrangements which influence heritage in an indirect way, that is, through funding or technical assistance. Further, more research is needed to assess the implications of the large degree of private stewardship in the watershed. The efforts of the land owner contact program of Carolinian Canada and the Natural Heritage League are most noteworthy and may be applicable here.

Other management considerations such as accessibility, accountability and coordination are also of concern. Once we have a better understanding of the effectiveness of the management arrangements which have a bearing on heritage planning and management, we will be able to determine provisions for accessibility; accountability and coordination.

Finally, there is the matter of public awareness. Further research is required to determine if the general public, as well as the managers and politicians, are sufficiently aware of the heritage resources that exist in the valley and their significance. If they are not, then plans should include raising the level of awareness of these resources and their potential for development.

Figure 1. Rivers nominated and designated to the Canadian Heritage Rivers System as of April 1988



* Designated rivers








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GRAND RIVER HERITAGE STUDY

Figure 2

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Date prepared - 1986.

BASIN-REGIONAL HERITAGE INSTITUTIONS

-  G.R.C.A. Managed Lands
Includes:
 - Conservation Areas
 - Flood Control Areas
 - Demonstration Areas
 - Reforestation Areas
 - Wildlife and Wilderness Areas
-  G.R.C.A. Construction, Fill and Alteration of Waterways to limit of Regulatory floodline on all water courses
R.R.O. 154/86, R.R.O. 631/88
-  County Boundaries
-  Regional Municipality Boundaries
-  Municipalities
-  Township Boundaries
-  Township Boundaries within Municipalities

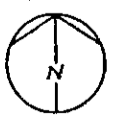
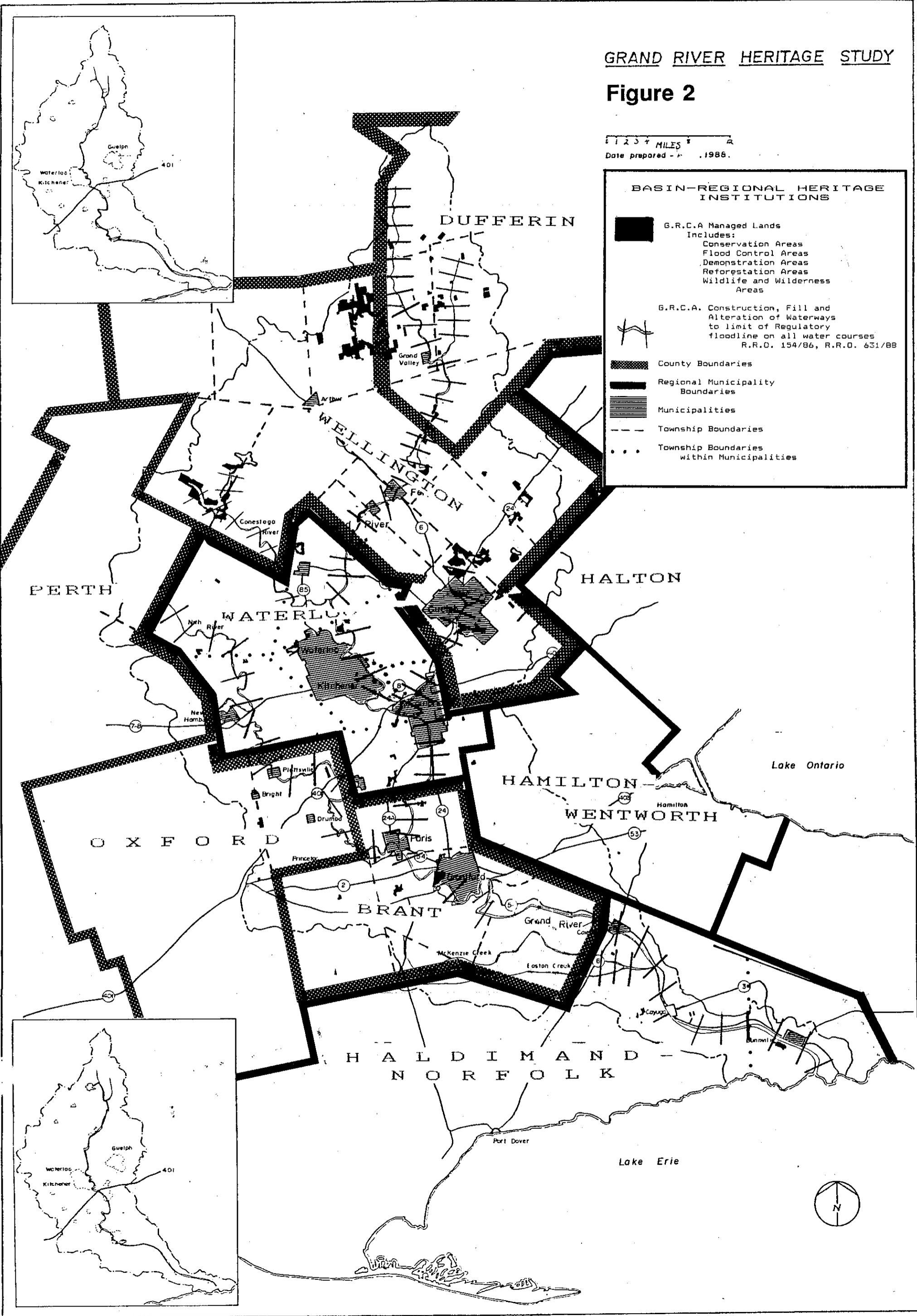


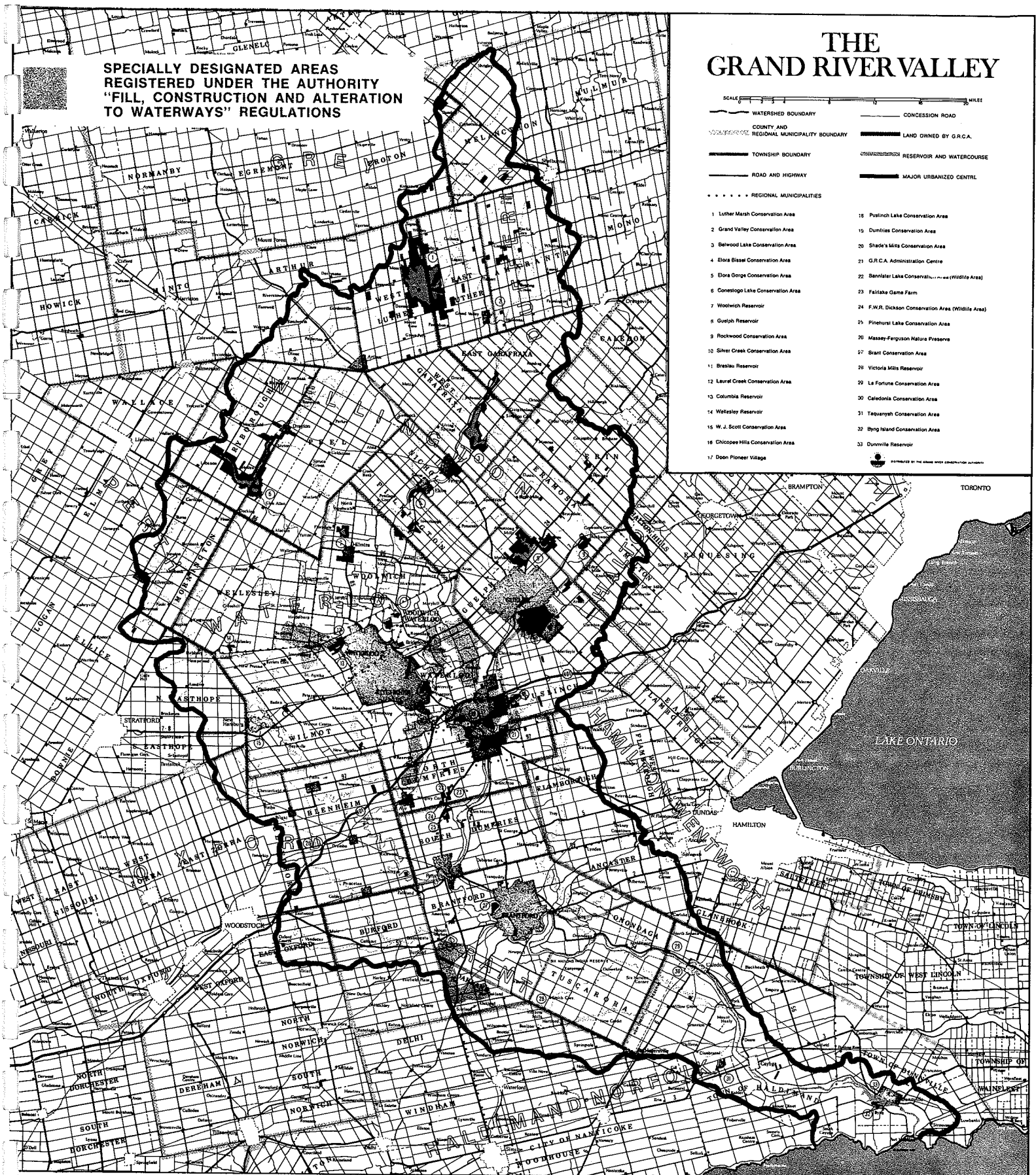
Figure 3

SPECIALLY DESIGNATED AREAS REGISTERED UNDER THE AUTHORITY "FILL, CONSTRUCTION AND ALTERATION TO WATERWAYS" REGULATIONS

THE GRAND RIVER VALLEY

- SCALE 0 1 2 MILES
- WATERSHED BOUNDARY
 - COUNTY AND REGIONAL MUNICIPALITY BOUNDARY
 - TOWNSHIP BOUNDARY
 - ROAD AND HIGHWAY
 - REGIONAL MUNICIPALITIES
 - CONCESSION ROAD
 - LAND OWNED BY G.R.C.A.
 - RESERVOIR AND WATERCOURSE
 - MAJOR URBANIZED CENTRE

- 1 Luther Marsh Conservation Area
- 2 Grand Valley Conservation Area
- 3 Belwood Lake Conservation Area
- 4 Elora Blasse Conservation Area
- 5 Elora Gorge Conservation Area
- 6 Conestoga Lake Conservation Area
- 7 Woodloch Reservoir
- 8 Guelph Reservoir
- 9 Rockwood Conservation Area
- 10 Silver Creek Conservation Area
- 11 Breslau Reservoir
- 12 Laurel Creek Conservation Area
- 13 Columbia Reservoir
- 14 Watesley Reservoir
- 15 W. J. Scott Conservation Area
- 16 Chicones Hill Conservation Area
- 17 Deep Pioneer Village
- 18 Postlich Lake Conservation Area
- 19 Dumfries Conservation Area
- 20 Shade's Mills Conservation Area
- 21 G.R.C.A. Administration Centre
- 22 Bannister Lake Conservation Area (Wildlife Area)
- 23 Fallis Game Farm
- 24 F.W.R. Dickson Conservation Area (Wildlife Area)
- 25 Plover Lake Conservation Area
- 26 Massey-Ferguson Nature Preserve
- 27 Brant Conservation Area
- 28 Victoria Mills Reservoir
- 29 La Fortune Conservation Area
- 30 Caledonia Conservation Area
- 31 Teanahoc Conservation Area
- 32 Byng Island Conservation Area
- 33 Dunsmile Reservoir










GRAND RIVER HERITAGE STUDY

Figure 4

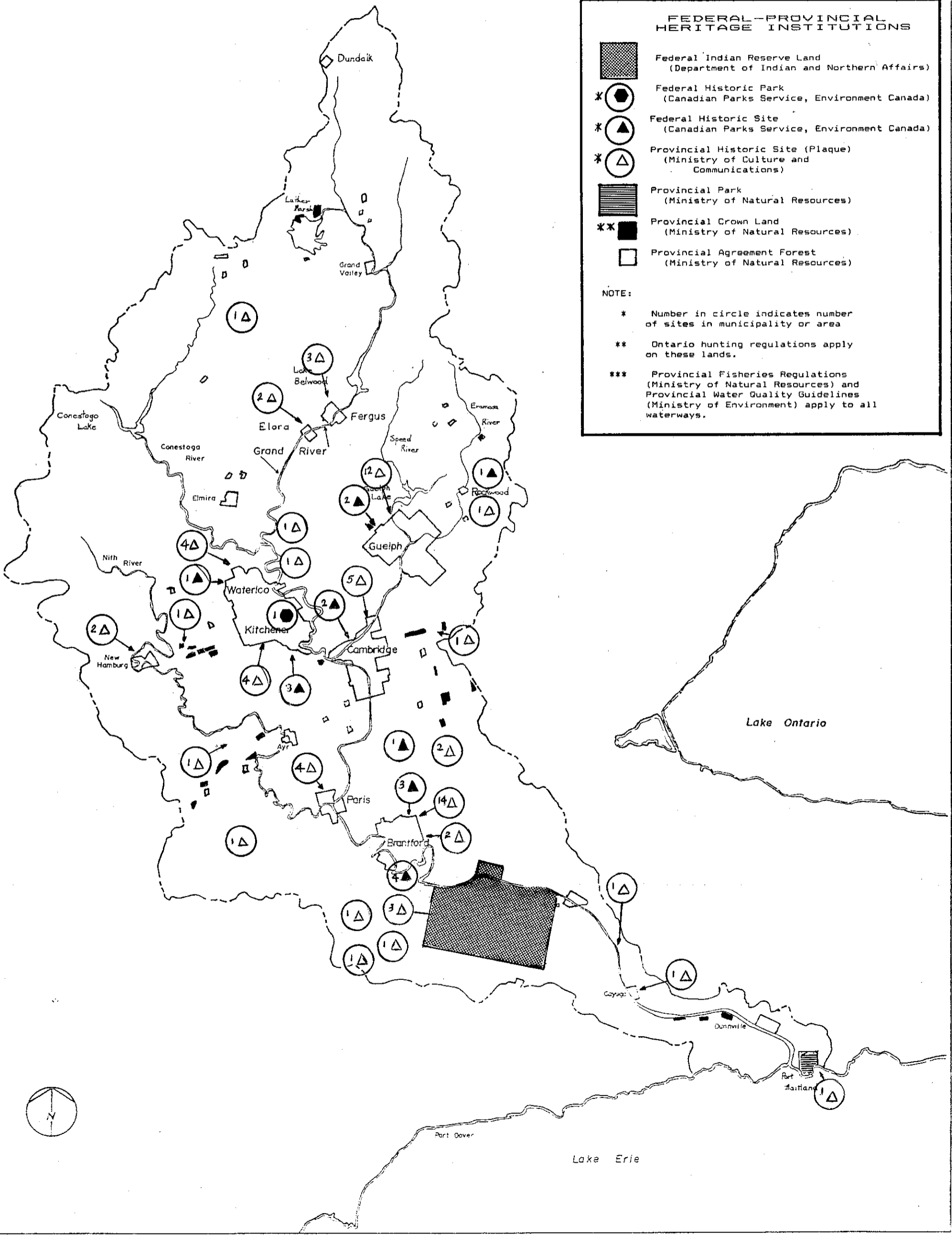
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Date prepared - 1988.

FEDERAL-PROVINCIAL HERITAGE INSTITUTIONS

-  Federal Indian Reserve Land (Department of Indian and Northern Affairs)
-  Federal Historic Park (Canadian Parks Service, Environment Canada)
-  Federal Historic Site (Canadian Parks Service, Environment Canada)
-  Provincial Historic Site (Plaque) (Ministry of Culture and Communications)
-  Provincial Park (Ministry of Natural Resources)
-  Provincial Crown Land (Ministry of Natural Resources)
-  Provincial Agreement Forest (Ministry of Natural Resources)

NOTE:

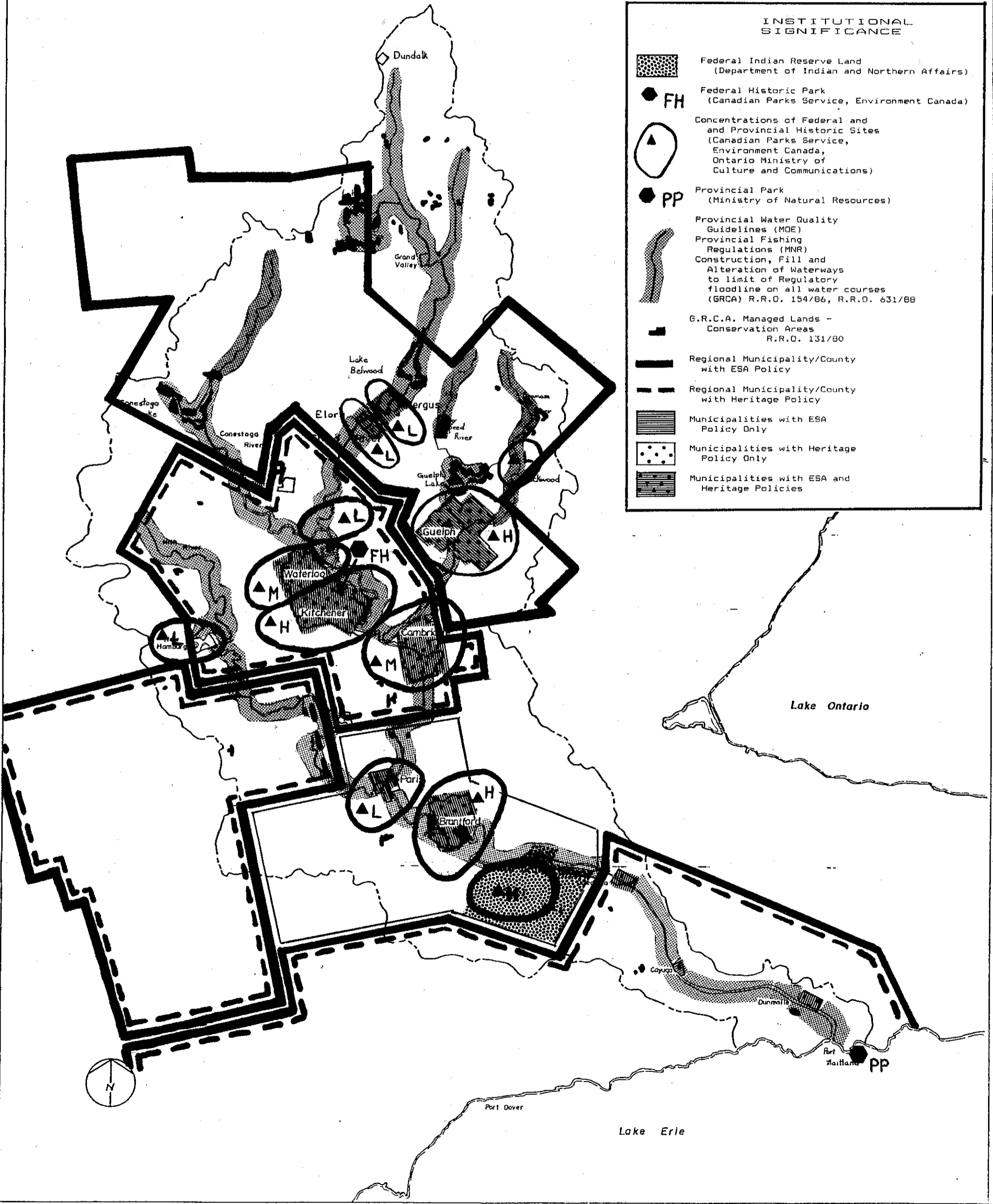
- * Number in circle indicates number of sites in municipality or area
- ** Ontario hunting regulations apply on these lands.
- *** Provincial Fisheries Regulations (Ministry of Natural Resources) and Provincial Water Quality Guidelines (Ministry of Environment) apply to all waterways.














GRAND RIVER HERITAGE STUDY

Figure 5

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Date prepared - P.C.G. 1988.



INSTITUTIONAL SIGNIFICANCE


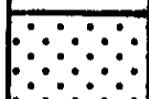
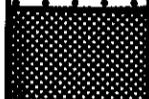
-  Federal Indian Reserve Land (Department of Indian and Northern Affairs)
-  Federal Historic Park (Canadian Parks Service, Environment Canada)
-  Concentrations of Federal and Provincial Historic Sites (Canadian Parks Service, Environment Canada, Ontario Ministry of Culture and Communications)
-  Provincial Park (Ministry of Natural Resources)
-  Provincial Water Quality Guidelines (MOE)
Provincial Fishing Regulations (MNR)
Construction, Fill and Alteration of Waterways to limit of Regulatory floodline on all water courses (GRCA) R.R.O. 154/86, R.R.O. 631/88
-  G.R.C.A. Managed Lands - Conservation Areas R.R.O. 131/80
-  Regional Municipality/County with ESA Policy
-  Regional Municipality/County with Heritage Policy
-  Municipalities with ESA Policy Only
-  Municipalities with Heritage Policy Only
-  Municipalities with ESA and Heritage Policies

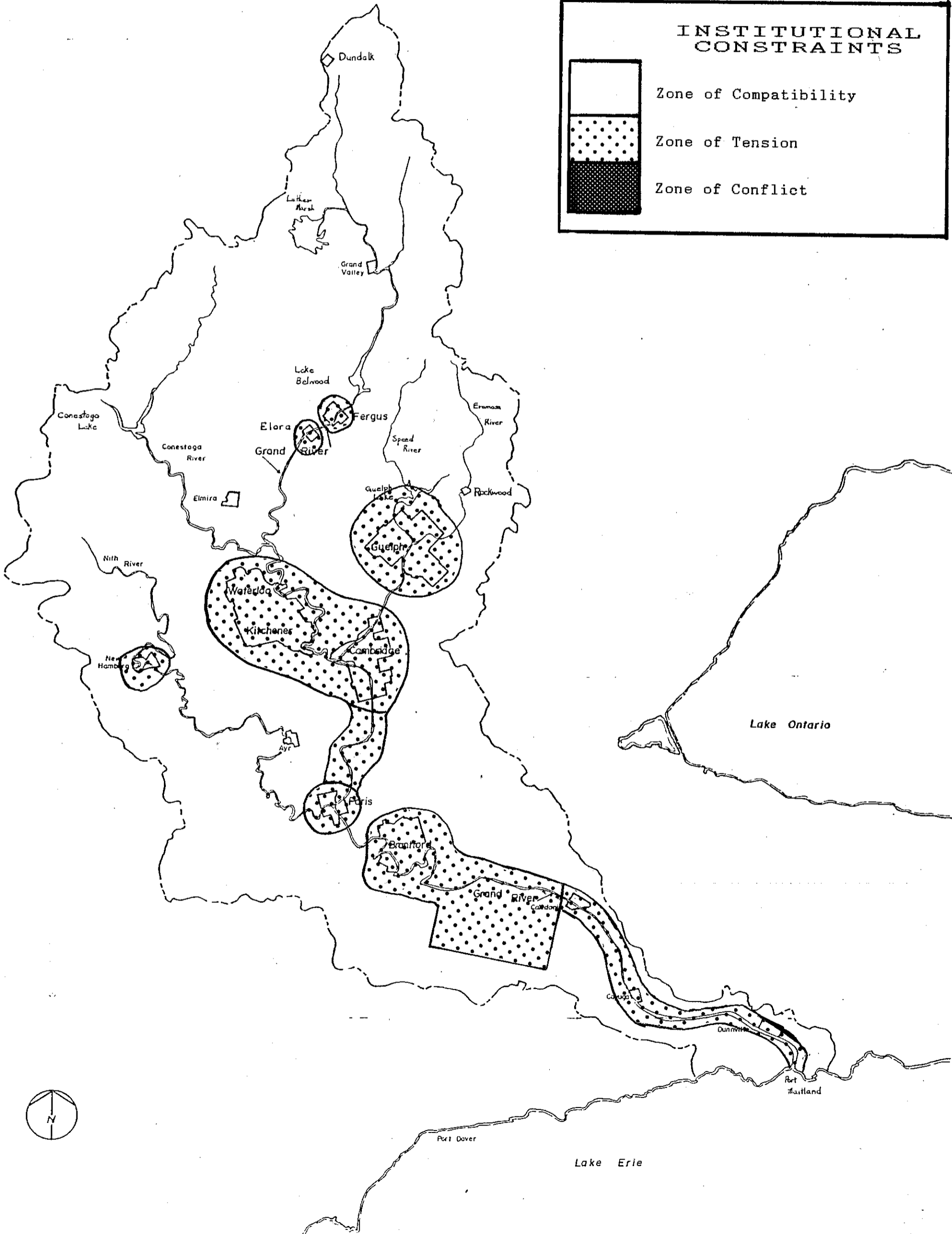
GRAND RIVER HERITAGE STUDY

Figure 6

0 1 2 3 4 MILES
Date prepared - *pld*, 1988.

INSTITUTIONAL CONSTRAINTS

	Zone of Compatibility
	Zone of Tension
	Zone of Conflict



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