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Natural Heritage Planning in the Carolinian Canada Zone

FINAL REPORT

Prepared by
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and
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Study Director

Heritage Resources Centre
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Executive Summary

• Carolinian Canada Zone is a significant natural landscape in southwestern Ontario that is home to a diverse collection of plant and animal species representative of southeastern United States habitats.

•The Carolinian Canada Program was established in 1984 to conserve this landscape through protection of 38 key representative and threatened sites.

• This report represents an examination of the potential for a landscape connectivity planning approach for the Carolinian Canada Zone currently under consideration by partners within the Carolinian Canada Program including Parks Canada.

• A review of landscape ecology and conservation corridor theory and research reveals a range of relevant scientific theory and conceptual designs, including landscape matrix, patches, corridors, and edges.

• The concept of corridors or greenways have developed into an important tool for conservation and habitat restoration but not without considerable debate and concerns for their potential impacts on species diversity and habitat functions.

• Planning of corridors has been examined in many locations with four case studies presented to illustrate attempts to apply the concept of corridors to assist in improving natural area connectivity.

• The potential for developing a landscape connectivity planning approach for the Carolinian Canada Zone is examined by initially reviewing existing natural area, land use planning and conservation initiatives underway by local municipal governments for each of the 38 Carolinian Canada sites.

• The results indicate a wide range of mechanisms used by planning agencies with considerable differences among municipalities within the Carolinian Canada Zone as well as varying degrees of effort and success.

• Generally, urban municipalities with larger populations tend to have more advanced planning arrangements in place for conservation of natural areas with significant gaps in the application of these initiatives noted in the central portion of the Carolinian Canada Zone - Kent, Elgin and Brant Counties.

• A regional landscape planning approach for the Carolinian Canada Zone will require effective use of private stewardship - continuing and extending current and previous efforts in this regard - in addition to co-operation and communication among the various land use planning agencies and concerned private groups in order to develop more consistent conservation initiatives across the region.

Recommendations and Research Needs

- Completion of a policy analysis to review ongoing changes in land use planning and conservation initiatives within the Carolinian Canada Zone in the context of reforms to the Planning Act, restructuring of provincial agencies including Conservation Authorities and the Ontario Ministry of Natural Resources, and municipal amalgamation.

- Mapping of natural area and conservation planning arrangements from Official Plans and Secondary Zoning Bylaws for each of the 38 Carolinian Canada sites and the surrounding landscape in order to develop a regional planning system.

- Conduct a workshop to assist in the co-ordination and communication efforts among the various planning agencies and municipalities with responsibilities for natural area management, land use planning, conservation and parks and protected areas with the Carolinian Canada Zone.

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1. Introduction

The Carolinian Canada program was launched in 1984 as a partnership between the World Wildlife Fund Canada, the Ontario Heritage Foundation, the Nature Conservancy of Canada, and the Richard Ivey Foundation (Allen et al., 1990). The Carolinian Canada Zone is the name given to the deciduous forest region of southern Ontario, and is bounded by Lake Huron, western Lake Ontario, and Lake Erie to the south (Figure 1). The Zone is home to diverse species representative of southern habitats from which its name is derived (Reid, 1985). The Carolinian Canada Zone is the northernmost range of eastern deciduous forest in North America, but is also the southernmost range for many boreal species of Canada. The Carolinian Canada Zone contains more nationally rare species of plants and animals than any other region of the country (Reid, 1985). It is because of this distinct character, and its location in the most heavily populated and intensely farmed landscape of the country, that the conservation of 38 sites identified for priority protection (Table 1), and restoration of linkages between them, is so critical.

Section 2 of this report sheds some light on landscape ecology and conservation corridor theory which provides the conceptual background and rationale for a connected system of protected areas. The problems of habitat fragmentation and the perils of isolated populations are discussed. The debate on the advantages and limitations of conservation corridors is made clearer through this literature survey, and enables a critical assessment of the application of corridors in the Carolinian Canada Zone.

Section 3 presents the results of a review of management and conservation arrangements for natural heritage planning in Ontario. The methods used to obtain, organize, review, and classify the information are described, followed by results and creation of a natural heritage framework to which all area municipalities should aspire. Section 4 discusses the options for complementary protection of natural heritage areas on private lands through land stewardship. The concept of stewardship and the Natural Heritage Stewardship Program used in the Carolinian Canada Zone are described as are the variety of tools for the stewardship and acquisition of these lands. Section 5 provides a discussion of the results of this study and the areas which require further effort if landscape connectivity planning is to be a reality for the Carolinian Canada Zone.

The appendix of this report contain the *Questions of Interest* as sent to key contacts for each of the 38 Carolinian Canada sites, results of the *Natural Heritage Framework* for each planning jurisdiction, criteria for making up each of the Natural Heritage Strategy Units (from Riley and Mohr, 1994), and examples of model natural heritage strategies and mapping.

Figure 1. Carolinian Canada Zone in Southwestern Ontario

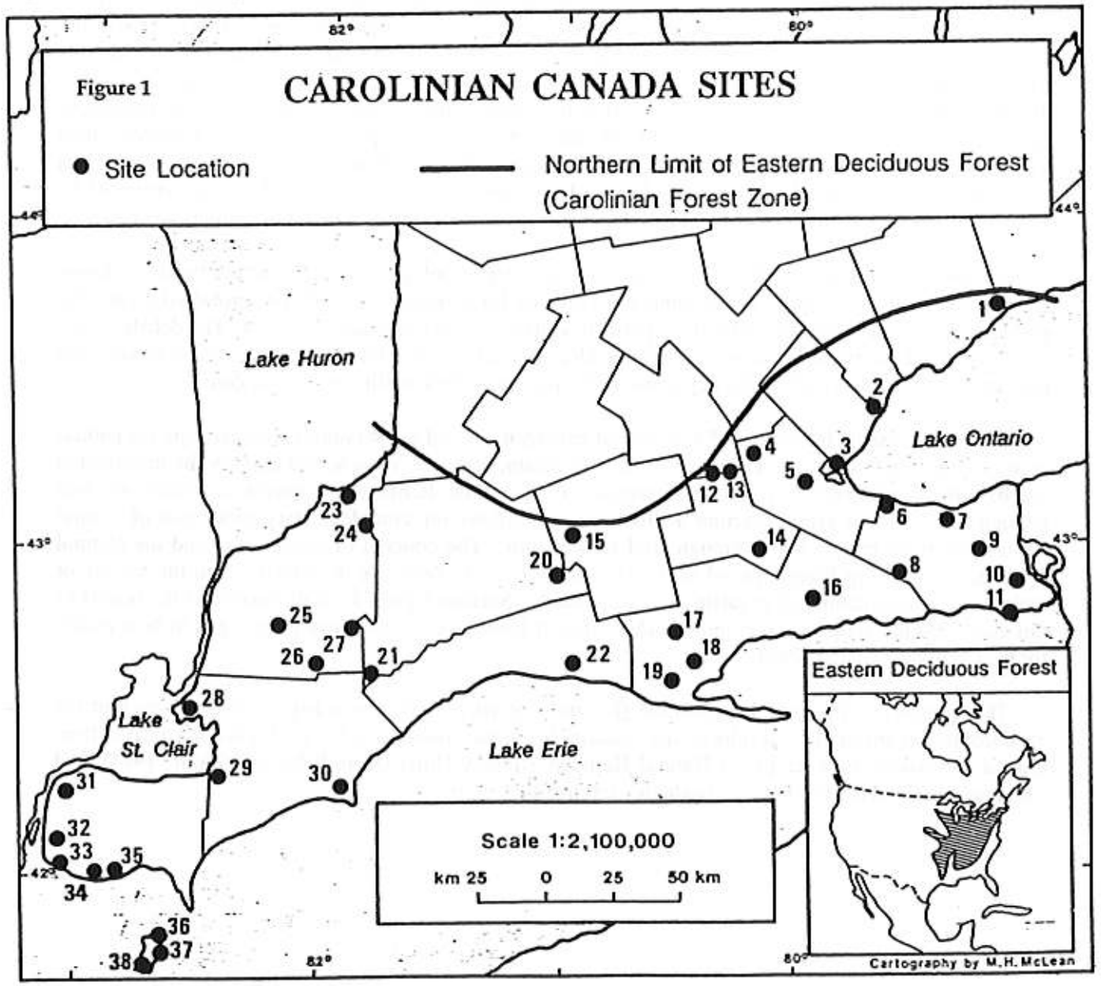


Table 1. Carolinian Canada Sites

Site	Location	Size	Comments
1. Rouge River Valley	Toronto	625 ha	Forest valley/river complex
2. Iroquois Shoreline Woods	Halton	84 ha	Upland Forests on shoreline terrace
3. Sassafras Woods	Halton Region	n/a	Upland forest on clay valley
4. Beverly Swamp	Hamilton Wentworth	4,850 ha	Lowland forested swamp
5. Dundas Valley	Hamilton-Wentworth	2,400 ha	Re-entrant valley in Niagara Escarpment
6. Grimsby-Winona Escarpment	Niagara Region	280 ha	Forested escarpment face and slope/valley
7. Jordon Escarpment Valley	Niagara Region	180 ha	Escarpment valley with terrace and floodplain
8. Caistor-Canborough Slough Forest	Niagara Region	1,400 ha	Forested slough/ridge patterned clay plain
9. Fonthill Sandhill Valley	Niagara Region	50 ha	Short Hills Forests
10. Willoughby Clay Plain	Niagara Region	590 ha	Oak forest complex
11. Point Abino Peninsula Sandland Forest	Niagara Region	345 ha	Lake Erie coastal shoreline dunes and wetlands
12. Sudden Bog	Waterloo Region	69 ha	Oak-hickory forest and bog complex
13. Grand River Valley Forests	Waterloo Region	755 ha	Valley-forest lake complex
14. Six Nations Indian Reserve Forests	Brant County	92,000 ha	Largest single block of Carolinian forest
15. Embro Upland Forest	Oxford	120 ha	Inland Forest
16. Oriskany Sandstone and Woodlands	Haldimand-Norfolk	335 ha	Upland forest and sandstone outcrop
17. Delhi Big Creek Valley	Haldimand-Norfolk	330 ha	River valley corridor and valley
18. St. Williams Dwarf Oak Forest	Haldimand-Norfolf	n/a	n/a
19. Big Creek Valley – South Walsingham Sand Ridges	Haldimand-Norfolk	210 ha 420 ha	River valley complex and sand plain forest
20. Dorchester Swamp	Middlesex County	380 ha	Wooded peaty swamp
21. Skunk's Misery	Middlesex County	1,235 ha	Upland and lowland forest communities
22. Catfish Creek Slope and Floodplain Forest	Elgin County	n/a	Valley forest with slope and bottomlands
23. Port Franks Wetlands and Forested Dunes	Lampton County	480 ha	Coastal dune and wetland system
24. Ausable River Valley	Lampton County	1,780 ha	Rocky gorge and river corridor
25. Plum Creek Upland Woodlots	Lampton County	220 ha	Oak-hickory forest
26. Shetland Kentucky Coffee Tree Woods	Lambton County	4 ha	Largest stand of Kentucky coffee-trees
27. Sydenham River Corridor	Lampton County	307 ha	Stream system
28. Walpole Island Indian Reserve	Lampton County	16,000 ha	Wetland-prairie system and savannah
29. Lake St. Clair Marshes	Lampton County	650 ha	Shoreline Marsh Complex on sand plain
30. Sinclair's Bush	Kent County	50 ha	Lowland to mesic woods with mature forest
31. Ojibway Prairie Remnants	Kent County	n/a	n/a
32. Canard River Kentucky Coffee Tree Woods	Essex County	99 ha	Southern riverine community
33. Big Creek Marsh	Essex County	600 ha	Wetland complex with open water
34. Oxley Poison Sumac Swamp	Essex County	40 ha	Swamp lowland forests, thickets, meadow
35. Cedar Creek	Essex County	565 ha	Creek valley system with willow swamp
36. Middle Point Woods	Essex County	38 ha	Deciduous woodlot
37. Stone Road Alvar	Essex County	50 ha	Complex of meadows, prairies, savannah
38. Middle Island	Essex County	46 ha	Forest on limestone island

Source: Eagles, P.J. and Beechey, T.J. (1984). *Critical Unprotected Natural Areas in the Carolinian Life Zone of Canada – Final Report.* World Wildlife Fund Canada.

2. Literature Review

2.1 Habitat Fragmentation

Despite our lack of knowledge about the functioning of ecological systems, a consensus has been reached among researchers that "habitat fragmentation is the most serious threat to biological diversity and is the primary cause of the present extinction crisis" (Wilcox and Murphy, 1985; Noss, 1987; Linehan, Gross, and Finn, 1995; Rosenberg et al., 1997). This consensus forms the basis for the vision of many conservation organizations and land use planning agencies, and is reflected in management goals, strategies, and efforts. Such is the case for the Carolinian Canada Program where a new conservation strategy envisions "halting the loss of biodiversity and achieving a substantial increase in size and quality of natural communities characteristic of Carolinian Canada" (Reid and Symmes, 1997).

There are basically two reasons why fragmentation threatens the continued existence of species: 1) fragmentation of the landscape results in a decrease in total habitat area, and 2) the remaining habitat becomes increasingly more isolated (Noss, 1987; Linehan et al., 1995; Rosenberg et al., 1997). Small and isolated populations of plants and animals may suffer a decline in genetic heterogeneity, increased extinction rates and decreased colonization rates because fragmentation poses barriers to floral and faunal dispersal (MacArthur and Wilson, 1967; Linehan et al., 1995; Rosenberg et al., 1997; Burke and Nol, 1998;).

Habitat loss and fragmentation is caused by a variety of human land use impacts including resource extraction, industrial effluent, and conversion of natural habitats to agricultural and urban land uses (Linehan et al., 1995; Burke and Nol, 1998). These land use pressures have also caused the conversion of unique Carolinian forest, wetland and prairie habitats into what is now the most heavily populated, urbanized, and intensely farmed landscape in Canada (Reid and Symmes, 1997). These ongoing land use pressures have conservationists concerned about the type of action that is appropriate to prevent and counter the effects of landscape fragmentation in the Carolinian Canada Zone. It is because of this concern that conservation organizations, including the Carolinian Canada Program are choosing to move in a direction that considers protected areas in the greater context of the surrounding landscape.

2.2. Conservation Approaches: Species, Ecosystems, or Landscapes?

Traditionally, conservation efforts have concentrated on securing target species and their habitats, and protected areas have been "set aside" as representative areas of biological diversity (Franklin, 1992). From the growth of disciplines such as conservation biology, landscape ecology, and island biogeography, has emerged a growing recognition of the need for action at higher levels of biological organization, namely the ecosystem and landscape levels (Noss, 1990; Franklin, 1992;). This is not to discredit the work and dedication of conservation organizations, which are largely responsible for the restoration and protection of what habitats are left. However, if society is to make a substantial contribution to the preservation of local and global diversity in the wake of increasing land use pressures, conservation strategies must adopt an integrated approach towards the management of species, ecosystems and landscapes.

Franklin (1992) illustrates the necessity for ecosystem and landscape approaches to the preservation of biodiversity. Perhaps the most fundamental and practical reason for doing so is that this approach is considered to provide the best means of preserving the millions of species on earth. This factor also underlies the limitations of a species-based approach to conservation: 1) lack of time to study and protect each and every species, 2) lack of financial resources, 3) lack of societal patience and support for such

an overwhelming task, and 4) an inability to keep up with scientific progress towards greater understanding of ecosystems and human impact upon them (Franklin, 1992).

Many others also advocate a landscape or regional approach to conservation because of what it may offer to the practice of land use planning (O'Connell and Noss, 1992; Franklin, 1993; Linehan et al., 1995). Planners are an influential constituency and, along with private landowners, are the ones deciding and creating future landscapes. It is therefore critical that a given conservation approach reflect the way planning agencies operate. Adoption of a regional approach to conservation may be feasible because it leaves room for planning jurisdictions to incorporate advances in landscape ecology and ensuing recommendations for the development of natural heritage strategies. A landscape approach to solving the problem of fragmentation, and ultimately the biodiversity crisis, is thus the conservation scheme of choice for the Carolinian Canada Program conservation effort and increasingly for the conservation community at large.

2. 3 Landscape Ecology

Although a relatively new discipline, especially in its application to land use planning, the term "landscape ecology" was first introduced in 1939 by Carl Troll, a geographer and biologist who merged his experience in aerial photographic interpretation with interest in a holistic planning approach to landscapes (van Langevelde, 1994; Zonneveld, 1994). It is from this perspective that the field of landscape ecology originated, and which Troll first defined as *"the study of the physico-biological relationships that govern the different spatial units of a region"* (Forman and Godron, 1986). The relationships which he referred to were both vertical and horizontal, the latter being the defining characteristic of landscape ecology; its focus on the relationships among spatial units over time (Forman and Godron, 1986; van Langevelde, 1994).

Much of what is known about the need for a landscape scale response to fragmentation stems from the work of Forman and Godron (1986), most often cited as the theoretical and methodological basis for the field of landscape ecology (Noss, 1987; Cook and van Lier, 1994; Linehan et al., 1995; Fleury and Brown, 1997; Rosenberg et al., 1997;). It is from their book entitled *Landscape Ecology*, which is a key text on the subject, that the contemporary and working definition of "landscape" was born: "a heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout. Landscapes vary in size, down to a few kilometres in diameter" (Forman and Godron, 1986). The authors provide an analysis of landscape structure, function, and change, as well as an introduction to the components of *patches* and *corridors* that exist within a landscape *matrix* (Forman and Godron, 1986; Linehan et al., 1995). Although inherent in any discussion on landscape ecology, the concept of corridors - their origin, function, and controversy - is treated later in this report.

2.3.1 Ecological Components: Matrix, Patches, Corridors

The *matrix* makes up the largest part of the landscape and includes the variety of land uses within which *patches* and *corridors* are embedded (Franklin, 1993). It is also the most connected part of the landscape, exerting the most influence over adjacent components (Linehan et al., 1995). In the case of the Carolinian Canada Zone of southwestern Ontario, the matrix is primarily urban, suburban, and rural in nature and encroaches upon the pockets of natural habitat representing either the patch or corridor components of the natural landscape. The greater the land use intensity within the matrix, the more it represents a barrier to the movement of species inhabiting isolated patches of remnant natural vegetation. Management of the matrix in such a way that enhances movement through it or increases overall area of patches within it, forms the basis for landscape ecology tactics designed to protect biological diversity (Franklin, 1993; Rosenberg et al., 1997;). Management of the matrix for this purpose requires features or

elements which increase the interchange of genetic information as well as individuals among populations occupying individual and often isolated patches in the landscape, thereby decreasing the possibility of extinction (Rosenberg et al., 1997). This is where corridors, such as riparian buffers or forested windbreaks, fit into the landscape; as they assist with connectivity among the patches.

Linehan and colleagues (1995) provide a clear description of both patches and corridors. Patches are non-linear components of the landscape that differ in appearance and breadth from the matrix in which they are embedded. The quality of a patch is dependent upon size, shape, and orientation within the landscape (Fleury and Brown, 1997). Circular patches are preferred to rectangular ones because they have a lower edge to area ratio, and thus have more interior habitat. Differences between circular and rectangular patches are theorised by Forman and Godron (1986) and have been included in Table 2 (Fleury and Brown, 1997).

Table 2. Patch Shape and Benefit

	Circular	Rectangular
Problem of barriers within	Less	More
Problem of habitat diversity	Less	More
Functions as movement	Less	More
Species diversity	More	Less
Foraging efficiency	More	Less

Source: Forman and Godron, 1986, p.111.

Edges are the habitat which generally forms the perimeter of a patch, and which are characterised by a community composition different from that of the interior. Edges are affected by light, wind, and soil conditions typical of the surrounding landscape and are penetrable by species from the surrounding or adjacent area. Such penetration results in modification of the floral and faunal species and communities occupying the edge to the point that it no longer resembles the interior of the patch.

Habitat patches are viewed as having a critical shape or as being above some critical threshold size to ensure that the interior remains relatively unaffected by its edges (Burke and Nol, 1998). Patches should be oriented in a way that facilitates, promotes, or supports movement of species from the corridor component into the patch component of the landscape (Fleury and Brown, 1997). In summary, "patch shape should be as circular as possible, oriented perpendicular to the corridor, and as large as possible" given landscape limitations (Fleury and Brown, 1997, p. 165).

Corridors by contrast are seen as linear components of the natural vegetation that also differ from the surrounding matrix, but generally connect patches of a similar vegetative type. Connectivity is the degree to which the system of patches and corridors is linked within a landscape matrix (Linehan et al., 1995; Fleury and Brown, 1997). Corridors are the component of the landscape which allow the movement of species, nutrients, and energy among multiple patches in the matrix, thereby mitigating against the problem posed by potential barriers in the matrix (Forman and Godron, 1986; Smith, 1993). Attributes that determine both the rate of movement through the matrix and the use-intensity of corridors, are the structure and anchor points of the corridor (Forman and Baudry, 1984; Lambton County, 1997).

Many researchers have gone into detail about the principles and critical attributes of corridors and patches, and the design of networks among them (Forman and Godron, 1986; Soule and Gilpin, 1991; Hellmund, 1993; Noss, 1993; Linehan et al., 1995; Fleury and Brown, 1997). A summary of critical corridor attributes and network design principles from the literature is provided in the following discussion.

2.4. Conservation Corridors

The recommendation that corridors be maintained or restored to allow movement among populations in isolated fragments was offered by Wilson and Willis (1975) in response to the proposed equilibrium theory of island biogeography (MacArthur and Wilson, 1967; Simberloff and Cox, 1987). The theory of island biogeography has long been used in the debate on the planning and design of nature reserves. The theory suggests that the level of species richness in an isolated patch is a function of distance, size, immigration and extinction rates.

A debate has also developed over whether it is better to have a few large or many small patches. The species-area relationship illustrates that species diversity is positively correlated with patch size, meaning that species diversity will increase with patch size until some point above which competition regulates species number. A decrease in habitat size due to habitat loss and fragmentation is accompanied by a reduction in species diversity.

Simberloff and Cox (1987) have expressed concern over the popularity of conservation corridors in providing a solution to the ever-present dilemma of habitat fragmentation and the preservation of biological diversity. This concern is justified in that there is a lack of empirical data supporting the use and effectiveness of corridors for the movement of wildlife through the landscape (Simberloff and Cox, 1987; Simberloff et al., 1992). Such concern warrants an in-depth literature survey of conservation corridor theory to clarify whether their use is relevant and effective in a landscape conservation approach for the Carolinian Canada Zone. The extent of the controversy over conservation corridors is explored in the following discussion, with particular attention directed to the ambiguous use and interpretation of the term corridor by conservation biologists, land use planners, environmentalists, and recreationists alike (Noss, 1987; Simberloff et al., 1992; Rosenberg et al., 1997).

2.4.1 Defining Conservation Corridors

In the literature, there are many different definitions and interpretations of the term corridor. Differences in definitions and interpretations of the structure and function of corridors have led to disputes; explaining one aspect of the current controversy over conservation corridors. One consequence of such ambiguity is the advocacy of corridors as a potential solution to a variety of ecological concerns. Critical thinking and observation is undoubtedly needed amidst the popularity of corridors for conservation planning.

This issue has not been entirely ignored by either side in the corridors debate, and warrants illustration in the form of a summary of the available definitions of corridors in the literature:

> Landscape ecologists Forman and Godron (1986) define corridors as *"...narrow strips of land which differ from the matrix on either side. Corridors may be isolated strips, but are usually attached to a patch of somewhat similar vegetation"* (p.123).
>
> *"A corridor is a linear landscape element that provides for movement between habitat patches, but not necessarily reproduction. Thus, not all life history requirements of a species may be met in a corridor"* (Rosenberg et al., 1997, p.678).
>
> *"Biological corridors may include linear patches, such as streamside riparian areas, shelter belts, forest remnants remaining from tree harvest, and , in agricultural areas, fencerows"* (Rosenberg et al., 1997, p.677).

"A faunal dispersal corridor is a naturally existing or restored native linear landscape feature that connects two or more larger tracts of habitat and functions as a dispersal route for native fauna and flora and for the occurrence of natural ecological processes"
(Harris, personal communication in Smith, 1993, p.11)

"Habitat space, buffer zones, multi-use zones, and human-built structures intended to assist animals in bypassing physical barriers such as highways" (Wiersma, 1996, p.55).

"Continuous, narrow patches of vegetation that facilitate movement among habitat patches, thereby preventing isolation of populations" (Merriam [1984] in Rosenberg et al., 1997, p.678).

In the United States, a 1987 report of the President's Commission on American Outdoors recommended the establishment of:

"Greenways, corridors of private and public recreation lands and waters, to provide people with access to open spaces and to link together the rural and urban spaces in the American landscape" (in Cutler, 1989, p.7).

"A greenway is a linear open space established along either a natural corridor, such as a riverfront, stream valley, or ridgeline, or overland along a railroad right-of-way converted to recreational use, a canal, a scenic road, or other route" or alternatively, *"an open space connector linking parks, nature reserves, cultural features, or historic sites, with each other and with populated areas"* (Little, 1990, p.1).

In the scientific community, a common thread is found in the *linear structure* and the *movement function* of corridors linking isolated patches. In land use planning, a common thread is the use of the term *greenway* rather than *corridor*, the use of the term *open space*, and the *recreational* idea. One can see how the variety of uses of the term corridor renders it convoluted, running the risk of the concept being used incorrectly by many to establish credence for their efforts and ideas.

2.4.2 A Brief History of the Corridors Concept

The previous discussion has examined the modern definitions and interpretations of the concept of corridors. It was roughly half a century ago that Aldo Leopold (1949) eluded to the need of a linked protected areas system as a practical means to the goal of species preservation (Cutler, 1989). His vision, although never referring to the term "*corridors*", provided an expanded role for conservation biologists "*to encompass saving a series of large habitats and encouraging the greatest possible diversity by linking these habitats*" [emphasis added] (Cutler, 1989, p. 6).

Other historical examples include the work of 19th century landscape architects and regional planners such as Frederick Law Olmsted, Ebenezer Howard, and Benton MacKaye (Smith, 1993). Olmsted proposed and designed linear open spaces linking city parks and the surrounding community, and emphasized the societal, aesthetic, and environmental health values of these "park ways". Although many of his designs either never materialised or were later trivialised by urban transport and sprawl, Olmsted's most famous design was Boston's Emerald Necklace, a ring of several natural areas, urban parks, and parkway segments (Smith, 1993).

A similar concept of urban greenways was emerging in England in the form of Ebenezer Howard's model of a "*Garden City*" (Howard, 1902). This model paved the way for the concept of "*greenbelts*" because the Garden City was structured to function much like a belt of forested and rural land preventing urbanization from moving out towards the countryside (Smith, 1993). Earlier this century, Benton MacKaye (1928) supported the greenbelts concept as a way of preventing urban sprawl and servicing recreation. His best known greenway proposal was the Appalachian Trail in 1921, now a world-renown system providing significant natural heritage protection and an important recreational experience in eastern North America (Smith, 1993).

2.4.3 The Role of Corridors: Habitat or Conduit for Movement?

If habitat fragmentation works to decrease habitat size and increase isolation among habitats, resulting in increased vulnerability of insular species, then the logical response to this problem would be to find some way of increasing habitat size and increasing connectivity among isolated patches (Noss, 1987). Corridors have been proposed as a solution because they offer the opportunity to do just that - counter the effects of habitat fragmentation. But the roles of corridors can be more complex.

Forman and Godron (1986) identify four major functions of corridors: 1) a habitat for certain species, 2) a conduit for movement, 3) a barrier or filter separating areas, and 4) a source of environmental and biotic effects on the surrounding matrix. Much of the relevant research literature has debated the duality of the first two functions, that is, corridors as habitats vs. corridors as conduits for movement, even though it was never suggested that these roles be mutually exclusive (Fleury and Brown, 1997; Rosenberg et al., 1997). Ideally, *both* habitats and corridors are essential to the conservation of biological diversity (Rosenberg, et al., 1997).

In discussing the role of corridors as habitat, it is useful to have a working definition of the term. *Habitat* is defined as "*a patch (or collection of patches) that provides resources needed for survivorship, reproduction, and movement* ". "*If average survivorship and reproduction rates allow a stable or growing population that produced emigrants, a habitat patch is a source patch; if it is dependent on immigrants to sustain its populations, it is a sink patch*" (Rosenberg et al., 1997, p. 678). This means that corridors will function as habitat for some species but not others. This duality among corridor functions only adds to the controversy of whether corridors are important components of a network of protected areas because they provide habitat, or because they ease movement.

Some concern arises if corridors are proposed as fulfilling a habitat role, their efforts and resources formerly intended for the acquisition of large, high-quality habitats will inappropriately be diverted to the acquisition of marginal linear habitats. Similarly, perceiving corridors as habitat implies more flexibility in land use options so that tradeoffs between protection and development are acceptable. Development and utilization of land and resources can both be supported so long as there is no net loss of overall habitat (Noss, 1992). Although this is not at all the intention of the corridors concept, it is nonetheless a legitimate argument against the perception of corridors fulfilling the role of habitat. This discussion does not begin to touch on the importance of linear riparian and other remnant habitats in their own right, independent of their function as either habitat or conduit (Simberloff et al., 1992; Rosenberg et al., 1997)

Corridors may also function solely as conduits for movement and ultimately assist in increased survival of populations. The role of corridors in this context is that of a mechanism allowing continued exchange of individuals among isolated patches which were connected prior to fragmentation (Rosenberg et al., 1997). This exchange would also reduce extinction rates which would otherwise result if the populations remained isolated. Corridors could contribute to a reduction in extinction rates by decreasing variability in birth and death rates, increasing colonization rates, decreasing inbreeding

depression, and by increasing potentially adaptive genetic variance for maintaining population fitness (Simberloff et al., 1992; Rosenberg et al., 1997).

2.4.4 Potential Advantages and Disadvantages of Corridors

Table 3 summarizes the advantages and disadvantages of using corridors for increased connectivity in settled landscapes. Simberloff and Cox (1987) illustrate the lack of evidence supporting the use of corridors as a solution to declining biodiversity and extinction, and provide justified arguments against their acceptance. Few alternatives to corridors in the landscape have been suggested (Noss, 1987). Simberloff and Cox (1987) offer few options for alternative courses of action. Manual translocation of individuals between isolated patches, or the protection of unconnected patches in between sites, are the only examples of alternatives to corridors found in the literature and these are also questionable. That few alternatives have been proposed to the use of corridors in preventing further habitat fragmentation and ensuing population decline, however, does not validate their use.

The degree to which any of the consequences identified in Table 3 may result is dependent upon the structure, community composition, and intention of the proposed corridor, and thus should not be considered as universal justification for the inclusion of corridors within a given landscape conservation strategy (Noss, 1987). It is necessary to be cautious in designing conservation strategies. Conservation corridors should only be considered following an evaluation of their actual need and function in the landscape in question, and as a complement to habitat acquisition, protection, and restoration.

Such a warning presents a dilemma in the context of the Conservation Strategy for the Carolinian Canada Program. Should valuable resources be spent moving towards greater connectivity between sites if an overall evaluation of the need or possibility for connectivity via corridors has not yet been established? In making the critical management decisions in addressing such a fundamental issue, land use planners in southwestern Ontario should examine attempts at the application of corridor planning.

Table 3. A Summary of Potential Advantages and Disadvantages of Corridors from the Literature (from Noss, 1987, p.160)

Potential Advantages of Corridors

- Increased immigration, which could
  - Increase/maintain species richness and diversity.
  - Increase population sizes of particular species.
  - Decrease probability of extinction.
  - Permit species re-establishment.
  - Prevent inbreeding depression/maintain genetic diversity.
- Increased foraging area for wide ranging species.
- Provide escape cover for movement between patches.
- Increase accessibility to a mix of habitats.
- Provide alternative refuge from large disturbances.
- Provide greenbelts to:
  - Limit urban growth.
  - Abate pollution.
  - Provide recreational opportunities.
  - Enhance and protect scenery.
  - Improve land values.

Potential Disadvantages of Corridors

- Increased immigration, which could
  - Facilitate the spread of diseases, pests, etc.
  - Decrease the level of genetic variation between populations (outbreeding depression).
- Facilitate the spread of fire and other contagious catastrophes.
- Increase exposure to hunters, poachers, and predators.
- May not function for species not specifically studied.
- Costs and conflicts with conventional conservation direction of preserving endangered species.

2.4.5 Towards Practical Applications of Corridor Planning

Although much has been researched and debated in the conceptual, theoretical, and design realm of landscape planning, few case studies exist on practical applications of conservation corridors and the institutional infrastructure supporting them. The case studies profiled herein are by no means a summary of all existing applications of corridor planning. They were selected to illustrate the common themes inherent in integrated landscape planning, and because of their relevance to the Carolinian Canada Zone. As will be seen in Section 3 of this report, these case studies assisted in developing a model for natural landscape planning in the Carolinian Canada Zone. The model, which reflects existing institutional arrangements in the region, can then be used as a guide by planners in creating natural heritage strategies aimed at greater protection and connectivity in the Carolinian Canada Zone.

The first two examples were selected to provide a comparison of two different frameworks for the design of landscape ecological networks. The first approach by Linehan et al. (1995) is based on landscape ecology, conservation biology, network theory, and landscape planning, and is from Central New England. The second approach, by Fleury and Brown (1997), considers both critical corridor attributes and target species in its design, and presents a case study from the Hanlon Creek watershed in Guelph, Ontario. The third example was selected because it provides a framework for the protection of natural heritage on private land - an issue relevant to the Carolinian Canada Zone.

The final example describes an assessment of the use of corridors in a regional conservation plan for Georgian Bay Islands National Park in central Ontario (Wiersma, 1996). This last example was selected because, like this study of the status of landscape connectivity in the Carolinian Canada Zone, it too was part of a Parks Canada directive aimed at establishing natural connections in the landscape surrounding a core protected area. A noteworthy point in the selection of the case studies is the presence of biophysical assessments and evaluation as the primary and final steps in the development of connectivity frameworks, respectively. The presence of these steps in all examples profiled here indicate the importance of such components in movement towards the practical application of corridor planning.

Linehan et al. (1995) developed an approach to designing and systematizing links between habitat patches. The major steps used in their approach are: Land cover assessment; Wildlife assessment; Habitat assessment; Node analysis; Connectivity analysis; Network generation; and Evaluation. The above framework was applied in the assessment of network development in Central Massachusetts (Linehan et al., 1995). The matrix area was composed of a mixed forest in a human-dominated landscape of villages, residential development, agricultural lands, and remnant forest patches. Forest remnants within the settled area were not considered in the applying the approach because the degree of fragmentation between them would not realistically lend itself to the foregoing seven steps. The approach yielded seven alternatives for connectivity in the study area. By applying the approach, the authors concluded that random connection of habitat patches is inefficient at maintaining viable habitat for target species in the study area. Such a conclusion indicates the importance of systematic assessment of natural linkages available for inclusion in any landscape conservation plan. That the approach was able to point out inefficiencies in the proposed network also gives credit to the use of landscape ecology and other theory, and supports continued research in the area of corridor planning.

Fleury and Brown (1997) developed a framework for the design of corridors using theoretical approaches from the disciplines of landscape ecology and conservation biology. The objectives of their study were to identify critical criteria for high quality corridors, select and analyze target species, and lastly to develop, apply, test, and evaluate the framework. Their framework, based on Hellmund's (1993) design of ecological greenways, combines planning components with conservation corridor theory in an

attempt to facilitate integrated natural heritage planning. Their framework, which consists of several tiers, includes the following steps:

1. Identification of corridor purpose, ecological purpose and social purpose.
2. Definition of critical corridor attributes: matrix, patch, network connectivity, barrier, length, width, shape, edge, structure, composition.
3. Identification of target species guilds: insects, reptiles and amphibians, birds, small mammals, medium mammals, and large mammals.
4. Identification of abiotic, biotic, and cultural characteristics of the region through an inventory. This inventory will then form the basis for identifying existing and potential corridors.
5. Development of the species guild requirements for each of the critical corridor attributes from Step 2.
6. Amalgamation of design requirements for each species guild into a single corridor design.
7. Corridor design for selected region.
8. Evaluation of corridor design for selected region, and feedback into Step 5.

This framework was applied to the Hanlon Creek watershed in Guelph, Ontario. The study area consisted of a matrix of residential, industrial, commercial, agricultural, and open space land uses (Fleury and Brown, 1997). The corridor design, based on species guilds in this region, was then examined to determine if high quality connections could be created within the landscape (Fleury and Brown, 1997). Six corridors, typically in the form of riparian habitat and hedgerows, were identified through application of the framework although none met all of the requirements of critical corridor attributes. The authors concluded that their framework could be valuable to landscape planners in identifying potential corridors. The main outcome of their study, however, is that much remains to be done in the application of conservation corridor theory to actual landscapes. This seems to be the approach in which corridor planning is taking place, and signals the need for more research into the application of ecological theory related to the design of conservation corridors.

O'Connell and Noss (1992) developed an approach to integrating conservation with private land management. Conservation on private land forms a significant part of the conservation strategy in the Carolinian Canada Zone, and is increasingly being used as a tool in the protection of natural heritage during a period of reduced public resources and less active role of government conservation agencies. Aimed at achieving their goal of "*maintenance of viable populations and natural distributions of native species and communities in the regional landscape*", the approach proposed by O'Connell and Noss contains a series of steps toward land management by private land stewards (1992). These include:

1. Evaluation of site characteristics through an inventory of biological resources and ecological processes;
2. Identification of elements of special significance through the development of criteria. This step would require data on species at risk, locally, regionally, and nationally. The main sources of this information in the case of the Carolinian Canada Zone are the Natural Heritage Information Centre (NHIC) in Peterborough, Ontario and the Committee on the Status of Endangered Wildlife in Canada;
3. Development of management objectives and stewardship principles. A listing of stewardship principles is provided, which guide the management decisions of landowners and ecologists in planning for biodiversity conservation;
4. Development of classes for each site, and the management objective governing each class. Classes should be ranked and managed from most significant to least significant, and incorporate regulatory requirements;

5. Development of monitoring procedures to assess the effectiveness of land management strategies. A ten-step process for monitoring, developed by Noss (1990), is suggested and modified to fit the private land management context; and
6. Adoption of an adaptive management framework to refine management practices on the basis of information obtained from monitoring.

The authors conclude by recognizing the need for complementary knowledge of incentives for biodiveristy conservation on private land, and of the social and planning climate of the given community. This program for private land management aimed at the maintenance of biodiversity reflects the vision described in the Conservation Strategy for the Carolinian Canada Program "*to halt the loss of biodiversity and achieve a substantial increase in the size and quality of natural communities characteristic of Carolinian Canada*" (Reid and Symmes, 1997, p. 5). It is for this reason that it is cited as an example of a practical application towards which planners and landowners in the Carolinian Canada Zone can work.

Planning in National Parks in Ontario has broadened in scope to include protection strategies for land uses surrounding park boundaries. At Georgian Bay Islands National Park, one of these strategies involved undertaking a visioning exercise for the establishment of natural connections between forested areas in the Greater Park Ecosystem (GPE). Wiersma (1996) discusses the planning and evaluation of corridors for the purpose of enhancing wildlife movement in the Georgian Bay region. The study area consisted of the shoreline and inland area surrounding Georgian Bay Islands National Park in central Ontario, and showed significant differences in physiographic characteristics between the Great Lakes St.-Lawrence Lowland region in the south and the Canadian Shield region in the north (Wiersma, 1996).

The planning team, along with Geomatics International, conducted a visioning exercise to identify core protected areas and potential corridors within the greater park ecosystem. The results identified the core natural areas, including national and provincial parks, provincially significant wetlands, Areas of Natural and Scientific Interest, First Nation Reserves, and areas identified under the Muskoka Heritage Areas Program (Wiersma, 1996). Like the proposed corridor design discussed in Case Study #2, potential corridors typically followed riparian systems and were preferably plotted on Crown land rather than private land. Effectiveness of the use of corridors for enhancing wildlife movement was tested on the basis of whether the distribution of target species was independent of the proposed core and corridor areas. Results indicated that the proposed corridors would not fulfil their purpose of facilitating movement of target wildlife. It was then recognized that alternative management strategies, based on differences between the northern and southern section of the GPE were needed as a solution to habitat fragmentation in the study area.

In the northern section, co-operation between Parks Canada and the Ontario Ministry of Natural Resources was suggested for maintaining the functional connectivity of the landscape rather than a specifically defined corridor system. Conversely, in the southern section, options for the protection of natural areas exist through either official plan zoning under the Planning Act or through private stewardship. It is clear how this case study most closely resembles that of the natural and institutional climate for connectivity planning in the Carolinian Canada Zone. The options for protection suggested by Wiersma (1996) signal the comprehensive strategy that will be needed for a similar undertaking in the Carolinian Canada Zone.

2.5 Discussion

The purpose of this review was to investigate, and acquire knowledge concerning the theoretical basis for the planning of conservation corridors, with specific application to landscape connectivity planning in the Carolinian Canada Zone. The results indicate that the design of natural corridors in the Carolinian Canada Zone is feasible and sound. However, due to the lack of research on the use of corridors by wildlife for dispersal and the limited application of examples of integrated landscape planning, is it worth pursuing a similar visioning exercise in the Carolinian Canada Zone? If resources are secured for this endeavour, will they have been better spent elsewhere in the long term should the corridors be ineffective in halting the loss of regional biodiversity?

From the urgency implied by the Conservation Strategy for Carolinian Canada, lack of action in the protection of natural heritage in southwestern Ontario is no longer an option. According to the literature on the perils of isolated habitat fragments, the increasing pattern of urbanization, residential expansion, and agricultural activity in the Carolinian Canada Zone will ultimately lead to the disappearance of remnant communities characteristic of southern eastern deciduous forest, wetlands, and prairies. As the options identified in the case studies suggest, multiple approaches are required in a regional conservation strategy.

3. Natural Area Planning in the Carolinian Canada Zone

In Ontario, a variety of institutional arrangements are in place for the conservation of natural heritage; arrangements that could prove to be important for the design of conservation corridors linking the 38 Carolinian Canada sites. The degree of conservation provided by each of the arrangements varies. This part of the study is intended to identify and describe the planning arrangements serving to protect natural heritage areas, and to report results from a study of the natural heritage framework of area municipalities within the Carolinian Canada Zone in southwestern Ontario. Being informed about land use planning at the municipal or county level is key to conservation efforts of this nature. Riley and Mohr (1994) indicate that,

> *" municipal land use planning is the most significant ecological 'experiment' going on in southern Ontario today because it exercises the most basic control over future land-use change. If properly designed and supported, the goals and requirements set by municipal, private and other land-use plans can significantly enhance the natural values of the landscape"* (p. 5).

Assessing the status of protected area planning in southwestern Ontario will provide the basis for a comparative analysis of the potential for landscape connectivity planning as envisioned in the Conservation Strategy for Carolinian Canada (1997). Municipalities with natural heritage systems are profiled herein as models against which remaining municipalities and counties should ideally measure up. A set of criteria is presented, which can guide the development of natural heritage systems in the region. Such criteria and model designs are recommended for creating a uniform approach towards future natural heritage planning and conservation in the Carolinian Canada Zone in southwestern Ontario. A combination of approaches to landscape planning and the development of natural heritage strategies were examined to determine the criteria and in selecting a model natural heritage framework (O'Connell and Noss, 1992; Riley and Mohr, 1994; Linehan et al., 1995; Wiersma, 1996; Fleury and Brown, 1997).

3.1 Methods for Data Collection

Methods carried out during this study reflect the original project objectives: 1) to review and evaluate existing land use planning arrangements for each Carolinian Canada site and area municipality - the focus being on current official plan and zoning by-law designations, and 2) to review and evaluate existing natural heritage strategies and discuss the range of land use planning, conservation, and management arrangements that should be considered for future efforts at natural heritage within the Carolinian Canada Zone.

The first step towards fulfilling these objectives began with the preparation of *Questions of Interest* designed to collect and organize key information required from area municipalities and Conservation Authorities within the Carolinian Canada Zone in southwestern Ontario. These *Questions of Interest* were included among a mailout distributed to key contacts for each of the 38 Carolinian Canada sites in each jurisdiction, as supplied by Doug van Hemessen - Carolinian Canada Coalition's Program Secretary. The list of contacts by jurisdiction, a copy of the mailout, and *Questions of Interest* are included in the appendix of this report.

The mailout, which was distributed the first week of December 1997, was intended not only to inform potential partners about the investigation, but also to stimulate response and obtain sources of information and documentation. The general response from the mailout was unfavourable, prompting the need to schedule interviews with contacts in each jurisdiction. From December 1997 to February 1998, follow-up interviews were held with most of the contacts, and/or discussion by mail or phone in an attempt to acquire and consolidate the remaining necessary information. The process generally yielded an abundance of background reports and information, copies of official plans and tree cutting by-laws, and natural heritage strategies and associated mapping from each area municipality.

The second step involved the review and evaluation of the information collected. Seven counties and six regional municipalities were examined and their official plans reviewed - where they existed:

The Counties of:
- Brant
- Elgin
- Essex
- Lambton
- Middlesex
- Oxford

The Regional Municipalities of:
- Haldimand-Norfolk
- Halton
- Hamilton-Wentworth
- Peel
- Waterloo

Township land use plans and secondary zoning bylaws were not examined in this exercise because of time constraints. In the special case of the Rouge River Valley Carolinian Canada site, which crosses several jurisdictions, the Rouge Park Management Plan was reviewed as opposed to reviewing the regional and local official plans.

A procedure was developed to classify the information representing the levels of land use planning arrangements. Upon completion of the review of the documents, it was possible to understand the overall extent of conservation planning in southwestern Ontario, to consolidate relevant information in the form of a *Natural Heritage Framework* for area municipalities, and to form an opinion on the readiness and expertise of area municipalities to participate in landscape conservation planning as proposed by the Carolinian Canada Program.

3.2 Land Use Planning and Conservation Arrangements

In their strategy for the planning of natural heritage areas, the Ontario Ministry of Natural Resources (OMNR) defines natural heritage as:

> *" geological features and landforms; associated terrestrial and aquatic ecosystems; their plant species, populations and communities; and all native animal species, their habitats and sustaining environment"* (OMNR, 1992).

Included among the land use planning and conservation arrangements are:

- Hills' (1961) classification of ecological site districts and physiographic regions on which many of the subsequent arrangements are based;
- the Provincial Wetlands Policy;
- the Provincial Policy Statement under the Planning Act (1996);
- Official Plans, Zoning, and Other By-laws
- Areas of Natural and Scientific Interest (ANSIs) (1983);
- Environmentally Sensitive Areas (Eagles, 1984);
- Statements of Conservation Interest;
- Tree-cutting By-laws under the Municipal and Trees Acts;
- Bioregional conservation plans (examples include: the Niagara Escarpment Plan, Lake Ontario Greenway Strategy, Rouge Park Management Plan, Carolinian Canada Conservation Strategy);
- Critical fish and wildlife habitat and endangered species, designated under the Fisheries Act and the Endangered Species Act respectively; and,
- a variety of public conservation lands.

(list from Riley and Mohr, 1994)

Public conservation of natural heritage occurs at all levels of government as represented by the system of parks and protected areas including municipal, regional, provincial, and national parks; public open space; Conservation Areas and other Conservation Authority lands; National and Provincial Wildlife Areas, Migratory Bird Sanctuaries, and Crown game preserves; Crown, County and Agreement Forests; and other Crown Lands (Riley and Mohr, 1994). A variety of alternative opportunities also exist for the protection of natural heritage areas on private lands. The options for private stewardship of land are discussed later in this report. The following discussion provides an introduction to municipal planning in southern Ontario. A series of designations serving to protect natural heritage are reviewed. These designations were most often encountered during this investigation, and are most suitable for consideration in a landscape planning framework.

3.2.1 Official Plans, Zoning, and Other By-laws

Land use planning in southwestern Ontario is governed by the Planning Act. The Planning Act governs the preparation of official plans and other land use planning arrangements for both branches of the municipal government structure in southern Ontario - county government and regional government (Gonzalez, 1996). Both governments function according to a two-tier system. In the county system, the upper-tier is the county government and the lower-tier consists of townships, towns, and villages. In the regional system, the upper-tier consists of a regional municipality where the lower-tier is represented by townships, villages, towns, and cities (Gonzalez, 1996). The two branches differ in that regional municipalities govern larger, more populated, areas and thus have greater responsibilities and offer more services than do counties.

During this study of area municipalities in the Carolinian Canada Zone, municipal official plans, Conservation Area management plans, and tree cutting by-laws were generally found to be the major planning tools available for the planning and protection of natural areas. Official plans are the tools of long term planning at the municipal level, describing land use designations, indicating the type of development permitted within specific areas, and forecasting future growth patterns in the municipality (Gonzalez, 1996). Official plans, which must be reviewed every five years, are approved by an upper-tier council following public consultation and then by the Ontario Ministry of Municipal Affairs and Housing. Lower-tier governments also develop local official plans that must conform to the upper-tier plans.

As mentioned earlier, seven counties and six regional municipalities were investigated and their official plans examined during this study. A number of municipalities had official plans containing natural heritage systems for environmental protection, supplemented by extensive mapping of designated natural areas. These were:

- The County of Lambton
- The County of Middlesex
- The County of Oxford
- The Regional Municipality of Haldimand-Norfolk
- The Regional Municipality of Halton
- The Regional Municipality of Hamilton-Wentworth
- The Regional Municipality of Peel
- The Regional Municipality of Waterloo.

Some municipalities do not have regional or even local official plans managing their decision-making process. Generally, the county system is least likely to have completed official plans, whereas the regional system seems to have highly advanced official plans and natural heritage systems. Also, where some counties and regions do not have official plans, the lower-tier governments may or may not have developed local official plans on which land use planning is based.

In the case of those municipalities without official plans, opportunities for the protection of natural areas exist mainly through zoning by-laws, tree-cutting by-laws, and through public or private acquisition and stewardship. Zoning by-laws control the designation of land and the conditions under which uses may be permitted in those lands (Gonzalez, 1996). Other by-laws that serve to protect environmental features in municipalities, with or without official plans, were tree-cutting by-laws. The Trees Act and the Municipal Act authorize municipalities to adopt tree-cutting by-laws to control the felling of trees by landowners (Riley and Mohr, 1994; Gonzalez, 1996).

3.2.2 The Provincial Wetlands Policy

A provincial policy statement, which was issued under the previous government's review of the Planning Act in 1994, governs the classification, management, and protection of wetlands (Riley and Mohr, 1994). It is not clear whether the Provincial Wetlands Policy is still being considered in the protection of wetlands in southern Ontario. It appears that the only policy governing development under the current Planning Act is the Provincial Policy Statement discussed in Section 1.3. One must distinguish between policy and legislation in interpreting the degree of protection afforded to wetlands and other natural areas. Policies under the Planning Act are statements of intent with respect to land use planning, and are not enforceable by law. The Planning Act states that local governments " shall have regard to" the Provincial Wetlands Policy in developing land use programs, regulations and laws

including Official Plans. This clause applies to most policies and programs presented in the sections that follow.

The Provincial Wetlands Policy includes a system for evaluating wetlands according to four major values - hydrological, socio-economic, biological, and species features - the scores of which determine wetland assignment to one of seven classes (Riley and Mohr, 1994; Hilts and Reid, 1993). Classes One to Three refer to wetlands deemed to be of provincial significance, while Classes Four to Seven refer to wetlands deemed to be of local significance. The wetlands policy also requires public planning agencies to conduct environmental impact assessments and consideration of alternatives to public sector activities proposed within 120 m of wetlands (Riley and Mohr, 1994; Gonzalez, 1996).

In the Carolinian Canada Zone, provincially significant and/or locally significant wetlands are afforded the highest degree of protection by those area municipalities having regional official plans. These wetlands are either included among core conservation lands and waters, or among corridor and linkage designations in regional natural heritage systems.

3.2.3 The Provincial Policy Statement

The Provincial Policy Statement was issued under Section 3 of the Planning Act and came into effect in May, 1996. This Policy Statement replaces the previous set of Provincial Policy Statements established in Bill 160, created in response to the recommendations of the Sewell Commission on Planning and Development Reform (OCPDR, 1993). The new Provincial Policy Statement reflects the current government's intent to decentralize power from the province to the municipalities in the area of land use planning. The result is a policy which can be loosely interpreted by municipalities and which has lenient requirements compared to the earlier synoptic approach towards land use planning in Ontario. In addition, the Provincial Policy Statement is anthropocentric in nature, as illustrated by these three principles guiding Ontario's long term economic prosperity, environmental health and social well-being:

1. To manage change and promote efficient, cost-effective development and land use patterns which stimulate economic growth and protect the environment and public health;

2. To protect resources for their economic use and/or environmental benefits; and,

3. To reduce the potential for public cost or risk to Ontario's residents by directing development away from areas where there is a risk to public health or safety or of property damage.

(from Government of Ontario, 1996, p.1)

The anthropocentric nature of the policy is implied by the notion that environmental benefits fall second to economic use in the protection of resources. Also, the primary principle of "*efficient, cost-effective development and land use*" does not take into account the possibility of initial higher costs associated with environmental planning.

Section 2.3 of the Policy Statement deals with natural heritage. The policy states that: *natural heritage features and areas will be protected from incompatible development* (Government of Ontario, 1996, p.8). The lenient nature of the policy is implied by the loose interpretation associated with the concept of "*incompatible development*". Nowhere in the policy does it state what is meant by incompatible development. Certain designated areas prohibit development and site alteration, whereas other natural areas are not protected from development and site alteration proposals that have demonstrated no negative impacts on the natural features or ecological functions of the area. The policy

does, however, acknowledge the notion of a connected network of natural areas through the following statement:

> *" the diversity of natural features in an areas, and the natural connections between them should be maintained, and improved where possible"*
> (Government of Ontario, 1996, p.8).

This statement supports the priorities of retention, restoration, and replacement, recommended by Riley and Mohr in their design of a natural heritage system for Ontario (1994).

Most municipal official plans that were reviewed in this study are in compliance with the earlier Comprehensive Set of Policy Statements, with the exception of Middlesex and Lambton Counties whose official plans are recent enough to have incorporated the new Provincial Policy Statement. Essex County is currently developing their official plan, and intends to incorporate the new policy. Reviews made to other official plans in the next five years will include the new land use planning directives. To facilitate compliance to the policy, the Ontario Ministry of Municipal Affairs and Housing has prepared guidelines to be used by municipalities in the implementation of the Provincial Policy Statement.

3.2.4 Areas of Natural and Scientific Interest (ANSIs)

Areas of Natural and Scientific Interest (ANSIs) are the product of an effort to conserve natural areas by the Parks and Natural Heritage Policy Branch of the Ontario Ministry of Natural Resources (OMNR) (Gonzalez, 1996). ANSIs are defined as *"areas of land and water containing natural landscapes or features which have been identified as having values related to protection, natural heritage appreciation, scientific study or education"* (ANSI Policy [1983] in Riley and Mohr, 1994, p.36). The identification of ANSIs is based on the natural areas meeting a set of five selection criteria - representation, diversity, ecological functions, condition, and special features. Assessments are conducted by OMNR and are published in Life Science or Earth Science Site District Reports (Riley and Mohr, 1994; Gonzalez, 1996). Those sites identified as best representing Hills' (1961) site districts and regions of Ontario are known as provincially significant life science ANSIs while the remaining sites are known as regionally significant life science ANSIs (Riley and Mohr, 1994).

ANSIs identified on private land gain the landowner property tax reductions through the Conservation Land Tax Rebate Program under the Conservation Land Act. Encouragement to conserve unique natural features on private land in the Carolinian Canada Zone, and elsewhere in the province, exists in the form of the Landowner Contact Program and the Natural Heritage Stewardship Program developed by the Department of Land Resource Science at the University of Guelph (Hilts and Moull, 1990).

3.2.5 Environmentally Sensitive Areas (ESAs)

Many municipalities, Conservation Authorities, and naturalist organizations have inventoried natural areas and evaluated the data against criteria for the designation of Environmentally Sensitive Areas (ESAs). No set definition exists of what constitutes an ESA. Natural areas most often designated as ESAs are those representing special physical and biological features characteristic of an area (Riley and Mohr, 1994). A set of proposed criteria for the designation of ESAs were developed in the late 1970s at the University of Waterloo (Eagles, 1984).

In their manual for land trusts, Hilts and Reid (1993) outline the criteria against which natural area inventories are evaluated in the designation of ESAs. These criteria are most likely adapted from original

reports on ESA planning and management (Eagles, 1984). It is evident from this set of criteria why the majority of Carolinian Canada sites have been designated as ESAs in municipal official plans. Most Carolinian Canada sites have nationally rare species, high diversity, and are remnants of much larger habitats that once occurred in southwestern Ontario.

An ESA designation does not always provide for legal protection of a natural area. Municipalities must acknowledge the ESA status of a natural area in their official plans to provide some degree of conservation. Some municipalities have separate policies and bodies governing the designation of ESAs. In the Carolinian Canada Zone, the Regional Municipalities of Haldimand-Norfolk, Halton, Hamilton-Wentworth, and Waterloo are among those having had ESA inventories updated by local naturalist groups or advisory committees and incorporated into their regional official plans. Where ESA studies may or may not have been completed, some municipalities choose to use ANSI inventories as the basis for an ESA designation.

A debate have occurred over the use of imprecise terminology in the identification and designation of natural areas (Ryan Stainton, personal communication). Some public planning documents use ESAs to refer to Environmentally Sensitive Areas, while others use it to refer to Environmentally Significant Areas. There is a great difference in meaning between these two uses of the term ESA. Some conservationists feel that the criteria used to designate ESAs describe natural areas that are *significant*, but which are not necessarily *sensitive*. For a natural area to be *sensitive*, many imply that the area must be largely incapable of withstanding the introduction of stress into the system. Low resistance followed by low resilience is what many believe characterizes an area as *sensitive*. Otherwise they are merely *significant* because they meet the criteria. It would then be a useful exercise for municipalities to define the way in which they interpret ESAs for their Official Plans and other land use planning programs and policies.

3.2.6 Statements of Conservation Interest

In some cases, agreements are made between land use planning agencies for the purpose of clarifying intentions regarding the protection of natural heritage areas. As is the case in the Carolinian Canada zone, such Statements of Conservation Interest have been signed between Conservation Authorities and the Ontario Ministry of Natural Resources " *to communicate to landowners and public agencies a brief description of Carolinian Canada Sites and ANSIs and to discuss aspects of the management of the sites which are conducive to the protection of the area's special features*" (OMNR, 1987). Van Hemessen (1994) completed a status report on the protection of Carolinian Canada Sites and provides a listing of all those sites for which Statements of Conservation Interest have been prepared. In 1994, twenty-eight of the thirty-eight sites had Statements of Conservation Interest prepared, plus four in draft form.

A Statement of Conservation Interest prepared for the Grand River Forests-Spottiswood Lakes sites by the Grand River Conservation Authority (GRCA) and OMNR was reviewed during this study. The Statement includes a description of the location of the sites; significant natural floral and faunal features; existing land uses, land use planning designations and other agency and landowner interests; management concerns and conservation objectives; and lastly, recommended planning and research strategies (OMNR and GRCA, 1990).

3.2.7 Bioregional Conservation Plans

Some municipal official plans make reference to conservation plans that span multiple political boundaries, and that follow physiographic features of the landscape. Three examples of these landscapes in the Carolinian Canada Zone are the Niagara Escarpment, the Rouge River Valley, and the Lake

Ontario waterfront. Conservation plans for the planning and management of these special features are the Niagara Escarpment Plan (1985), the Rouge Park Management Plan (1994), and the Lake Ontario Greenway Strategy (1995).

Each of these bioregional conservation plans has land use policies regarding the type of activities, development, and site alteration that may take place within designated areas. Land use policies were developed according to biophysical inventories, meaning that areas considered to be the most significant in terms of floral or faunal communities are those afforded the most protection. In most cases, the plans suggest the use of buffers between these special preservation areas and surrounding land use. The conservation plans are bioregional in nature because they approach the planning and management of natural heritage areas by biophysical and cultural boundaries rather than by political ones (Berg, 1985). It is less evident how social and cultural issues are incorporated into the plans.

Design approaches of a bioregional nature need to be emphasized in land use planning. Advances in the various disciplines of ecosystem science should be allied with advances in land use planning for the protection of natural heritage. A significant amount of research literature on this subject has been published. The most comprehensive review of an ecosystem-based approach to the planning and management of natural areas has been completed by Grumbine (1994). Grumbine reviews the variety of interpretations and applications of the concept of ecosystem management in an effort to come up with common themes to the approach. His findings resulted in ten dominant themes of ecosystem management which formed the basis for a working definition: *"Ecosystem management integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long term"* (Grumbine, 1994, p.31).

Although it is not the intention of this report to delve into the complex nature of ecosystem management, it is worth acknowledging that it certainly applies to the development of a natural heritage strategy for the Carolinian Canada Zone. Co-ordination and co-operation among municipalities, environmental organizations, naturalist groups, and the public is necessary in moving towards connecting protected sites in the landscape. Without ecosystem management or a bioregional approach, both of which respect the natural and cultural identity of the region, land use planning for such a purpose will be unsuccessful.

3.2.8 Fisheries Act and Endangered Species Act

The Fisheries Act was designed to control and protect critical fish and wildlife habitat as part of the planning and management of aquatic resources. Recently, however, the Fisheries Act is no longer being enforced in the Province of Ontario due to lack of funding to the provincial government to administer this federal legislation (George Francis, personal communication). Nonetheless, habitats listed under the Fisheries Act still form the basis for the criteria under which significant natural areas in municipal official plans are designated. Critical fish and wildlife habitat typically includes: coldwater and warmwater streams; spawning beds; migratory routes; groundwater recharge and discharge areas; and migratory waterfowl staging areas (Riley and Mohr, 1994). The provincial Endangered Species Act is intended to restrict threats to designated species and their habitats. The designation of endangered species and species at risk in Ontario is made possible through the combined efforts of the OMNR, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Conservation Authorities, and naturalist organizations (Riley and Mohr, 1994). The Endangered Species Act as an institutional arrangement is significant for the protection of Carolinian species because the majority of listed species are concentrated in the Carolinian Canada Zone (Riley and Mohr, 1994).

3.3. Natural Heritage Framework

The following discussion identifies many of the land use planning and conservation arrangements found to exist in most jurisdictions of the Carolinian Canada Zone. A *Natural Heritage Framework* was developed for this research to organize and evaluate the results of the *Questions of Interest* and review of land use planning arrangements for comparison between jurisdictions (Table 4). The *Natural Heritage Framework* includes contact information for each site/municipality; a listing of Carolinian Canada sites in that municipality along with lead agency information and designations; natural heritage systems and related mapping where they exist; related programs and policies for the protection of natural heritage in the municipality; and responses to the *Questions of Interest* originally prepared for this investigation.

The *Natural Heritage Framework* has been completed for the regional and county municipalities within the Carolinian Canada Zone and the results are found in the appendix of this report. The results form the majority of the work performed for this study in examining the planning and management arrangements facilitating landscape connectivity in the Carolinian Canada Zone, and form the basis for the comparative analysis in this report.

The most common institutional components identified in the review of official plans and natural heritage systems in the Carolinian Canada Zone are:

- Biophysical inventories;
- Statements of Conservation Interest;
- Official Plan designations and Tree Cutting By-laws
- Environmental impact assessments;
- Environmental advisory committees; and,
- Natural heritage systems made up of:
  - Core conservation lands and waters;
  - Corridors;
  - Connecting Links;

Statements of Conservation Interest will not be covered in this review as details regarding these were mentioned earlier in this report.

Table 4. Proposed Natural Heritage Framework

NATURAL HERITAGE FRAMEWORK	
Regional Municipality/County:	
Contact Information: **Telephone:** **Fax:** **Mailing Address:**	
Carolinian Canada Sites	**Lead Agencies**
Official Plan Status:	
Site Designations:	
Natural Heritage Inventory/Study:	
Natural Heritage Strategy/System:	
Mapping:	
Related Works:	
QUESTIONS OF INTEREST	
What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?	
What methods have been used to identify natural areas in your jurisdiction?	
What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?	
Are you aware of any land acquisitions related to the sites? Or, are you aware of any additional landowners participating in the Conservation Land Tax Reduction Program?	
Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?	
What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?	
Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)	
What natural area designations exist between Carolinian Canada sites that would allow for their connectivity? (incl. utility corridors and waterways)	

3.3.1 Biophysical Inventories

All Carolinian Canada sites have had some type of biophysical inventory conducted in the past as part of either ANSI inventories, ESA inventories, or by the Identification Subcommittee of Carolinian Canada in producing their final report of *Critical Unprotected Areas in the Carolinian Life Zone of Canada* (Eagles and Beechey, 1985). Whether the information from these inventories was used in developing planning documents is a more complex issue. Many of the original inventories have been updated for use as the first step in developing a natural heritage system, while others have not been updated and have not been used since.

Area municipalities/counties whose inventories have been used in designing their natural heritage system include the Regional Municipalities of Halton, Hamilton-Wentworth, Peel, and Waterloo; the Counties of Essex (in-progress), Lambton, and Middlesex; and the Rouge Park Alliance in designing the Rouge Park Management Plan. Inventories in Haldimand-Norfolk and Oxford County formed the basis for official plan natural heritage policies, although natural heritage systems with proposed connecting links have not yet been developed. Although inventories have been done in the Regional Municipality of Niagara and the Counties of Kent, Elgin, Brant, these jurisdictions have no official plans or natural heritage systems, nor are they currently proposing to develop them. As mentioned earlier, lower-tier planning documentation was not consulted to determine whether the inventories were being used at that level.

3.3.2 Official Plan Designations

Perhaps the best way to account for the variety of official plan designations applied to each of the 38 Carolinian sites is in the form of Table 5. Information provided in Table 5 was obtained from summary work completed by Doug Van Hemessen in 1994 and updated during this study with review of current planning arrangements for each of the sites. All sites have some form of local or regional planning designation with the exception of Catfish Creek Slope and Floodplain Forest (Kent County), and the Six Nation Forest and Walpole Island Reserve Sites. Although not all designations are included under natural heritage sections of land use planning documents, some degree of protection is afforded under hazard land or agricultural designations and may be accompanied by flood and fill regulations or tree cutting by-laws. In the case where there is no municipal official plan, or the status of local official plans is unknown, a site may have been identified by the local Conservation Authority.

3.3.3 Natural Heritage Strategies

Natural heritage strategies have been developed for the Regional Municipalities of Halton, Hamilton-Wentworth, Peel, and Waterloo; the Counties of Essex (in-progress), Lambton, and Middlesex; and the Rouge River Valley. These municipalities can serve as a model to be followed by others, having made commitments to natural heritage inventories and databases, watershed studies, environmental impact assessment policies, and established environmental advisory committees. Other municipalities are in the process of updating their planning arrangements, while others maintain a more traditional approach to land and resource use. From this study, a generalization can be made that those municipalities situated in highly developed, urbanized, and populated areas have a higher tax base from which to draw funds and resources for the development of more advanced land use planning and natural heritage conservation systems. These municipalities are also more likely to put more pressure on significant natural areas in their vicinity, thereby justifying the existence of a more advanced natural heritage framework.

Table 5. Official Plan and Zoning By-law Designations for Carolinian Canada Sites.

Carolinian Canada Site	Official Plan Designations	Zoning By-law Designations
Ausable River Valley	Lambton Environmentally Sensitive Area Middlesex Agricultural	Bosanquet • Environmental Protection • Agricultural W. Williams • Open Space • Agricultural
Beverly Swamp	Hamilton-Wentworth Environmentally Sensitive Area Waterloo Environmentally Sensitive Policy Area	Flamborough • Hazard • Conservation Management Zone North Dumfries Agricultural
Big Creek Marsh	• Environmental Protection • Recreational (C.A. property) • Agricultural	• Environmental Protection • Recreational (C.A. property) • Agricultural
Big Creek Valley-South Walsingham Sand Ridges	Environmentally Sensitive Area	• Hazard land • Agricultural
Caistor-Canborough Slough Forest	Niagara Environmentally Sensitive Area Haldimand-Norfolk Agricultural	West Lincoln Agricultural Town of Dunnville Agricultural
Canard River Kentucky Coffee Tree Woods	Natural Environment	• Watercourse • Agricultural • Institutional
Catfish Creek Slope & Floodplain Forest		currently Agricultural proposed for Hazard
Cedar Creek	Gosfield S. • Watercourse • Environmental Protection • Wetland • Estate Residential • General Agricultural Colchester S. • Floodplain • Development Control Area	Gosfield S. • Watercourse • Environmental Protection Colchester S. • Floodplain • Development Control Area • Estate Residential • General Agricultural • Wetland
Delhi Big Creek Valley	Hazard land	Norfolk Hazard land Delhi Hazard land

Carolinian Canada Site	Official Plan Designations	Zoning By-law Designations
Dorchester Swamp	Environmental Protection Area	Environmental Protection "large part"
Embro Upland Forest	Environmental Protection	General Agriculture
Fonthill Sandhill Valley	Special Rural	Niagara Escarpment Development Control Area
Grand River Valley Forests-Spottiswood Lakes	Waterloo ESPA Cambridge Green Zone Brant Environmental Protection	N. Dumfries Rural/ Open Space Cambridge Green Zone S. Dumfries •Extractive Area •Quarry Industrial Zone •Residential Zone
Grimsby-Winona Escarpment and Beamer Valley (Niagara Escarpment Section)	Environmentally Sensitive Area	Niagara Escarpment Development Control Area
Iroquois Shoreline Woods	Halton Environmentally Sensitive Area Parkway Belt West Plan Public Open Space	
Jordan Escarpment Valley	Environmentally Sensitive Area	Niagara Escarpment Development Control Area
Lake St.Clair Marshes	Marsh	Marsh
Middle Island	Environmental Protection	Environmental Protection
Middle Point Woods	• Environmental Protection • Agricultural • Resort	• Environmental Protection • Agricultural • Resort
Oriskany Sandstone & Woodlands	Haldimand-Norfolk Ecological Area of Regional Significance Town of Haldimand • Extractive • Agricultural • Environmental Protection	• Open Space • Hazard • Agriculture
Ojibway Prairie Remnants	Environmentally Significant Area (ERCA)	• Open Space • Industrial • Residential

Carolinian Canada Site	Official Plan Designations	Zoning By-law Designations
Oxley Poison Sumach Swamp	Wetland	Agricultural
Plum Creek Upland Woods	Agriculture	• Environmental Protection • Agriculture
Port Franks Wetlands and Forested Dunes	Significant Natural Area	• Commercial Highway • Future Development • Special Residential • Residential • Environmental Protection
Rouge River Valley	owned publicly for conservation purposes	
St. Williams Dwarf Oak Forest	Environmentally Sensitive Area	
Sassafras Woods	Halton: Environmentally Sensitive Area Parkway Belt West Plan: Public Open Space	
Shetland Kentucky Coffee Tree Woods	• Hazard land • Agricultural	• Hazard Land • Agricultural
Sinclair's Bush	Agricultural	Agricultural
Six Nations Reserve Forests		
Skunk's Misery	Agricultural	Agricultural
Stone Road Alvar	Environmentally Significant Area (ERCA)	
Sudden Bog	• Environmentally Sensitive Policy Area • Extractive • Agricultural	Agricultural
Sydenham River Corridor	Lambton: • Hazard Land • Agricultural Middlesex: • Rural Residential • Hazard Land	Brooke & Euphemia: • Hazard Land • Agricultural Moss: Agricultural
Walpole Island Reserve		
Willoughby Clay Plain Forests	Environmentally Sensitive Area	• Conservation-Open Space • Rural

3.3.4 Related Protection Arrangements

A number of jurisdictions have additional approaches related to the protection of natural areas. These usually take the form of environmental impact statement policies, environmental advisory committees, natural heritage databases, or local conservation groups. The existence of these approaches implies a more advanced formal system for the identification, management, monitoring, and restoration of natural areas designated in official plans. These various approaches can also be key to the ability of area municipalities to move towards a landscape level approach to conservation and are evidence of established partnerships between government and the public. They also indicate knowledge among the community of available programs and information for protected areas. Jurisdictions with more advanced infrastructure for implementing natural heritage strategies should share their knowledge with jurisdictions who are less well-equipped and whose planning arrangements are less advanced.

3.4 Landscape Connectivity Planning

Studies done by Fleury and Brown (1997), Noss and O'Connell (1992), Linehan et al., (1995) and Riley and Mohr (1994), outline a set of necessary components inherent in a framework for a natural heritage and landscape planning approach (Figure 2). This framework reflects interest in moving beyond an "*Islands of Green*" approach to natural area planning and conservation.

> "*There needs to be a well-planned, ambitious program that links current protected areas, restores and reforests degraded habitats between them, and experiments with ecologically and economically sustainable development (including forestry and farming). This should be done in complete co-operation with local communities and landowners, be governed by the principles of conservation of biological diversity, and be targeted at the best re-creation possible of the rich Carolinian diversity that once graced southwestern Ontario.*" (Van Hemessen, 1994, p. 26)

The above statement reflects the three conservation priorities identified by Riley and Mohr (1994) for use in a natural heritage strategy: retention, restoration, and replacement. These three priorities, along with the need for co-operation with private landowners, combine to make up the type of comprehensive regional conservation strategy suggested earlier in this report. The retention and acquisition of natural habitat for the 38 Carolinian Canada sites should continue to remain a focus in the overall conservation strategy for the Carolinian Canada Zone. However, this priority should be complemented with identification of potential corridors linking core sites, as well as identification of target restoration and replacement areas.

3.5 Comparative Analysis

Included in the rationale for investigating landscape connectivity in the Carolinian Canada Zone was the aim to compare existing land use planning arrangements of each area municipality and to identify gaps or areas where further effort is required. In order to assess which municipalities are ready to move towards landscape planning in the Carolinian Canada Zone and which ones are not a comparative matrix was developed according to the criteria described in Table 6.

Table 6. Criteria for classification of municipalities.

Biophysical Inventory.
Current Official Plan Status (1990 +)
Environmental Impact Assessment Procedure.
Natural Heritage Database.
Natural Heritage System and Mapping: • Carolinian sites are designated as Core Conservation Lands and Waters. • Potential corridors have been identified.
Implementation Strategy: • Communication Strategy. • Recommendation to Council. • Management Committee/Environmental Advisory Committee. • Land Stewardship Program/Landowner Contact Program.

The development of criteria serving to classify municipalities according to their readiness to undertake landscape connectivity planning in the Carolinian Canada Zone is based on two criteria:

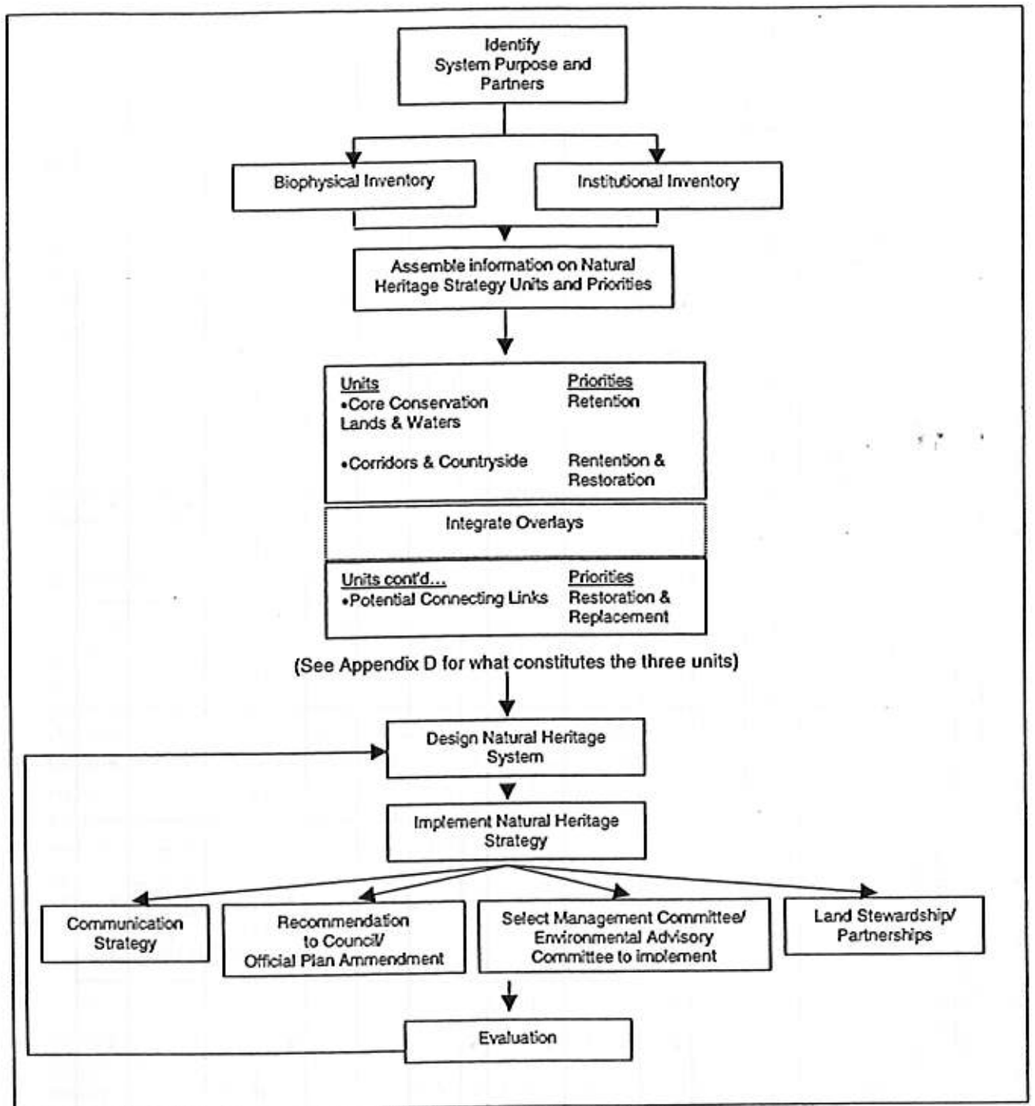
1. Applicability of existing efforts by area municipalities to the framework in Figure 2; and,
2. The range of conservation and natural heritage arrangements identified by area municipalities forming natural heritage systems (see appendix).

Natural heritage systems and mapping are generally at the conceptual stage in the Carolinian Canada Zone. No municipalities have gone into the implementation stage. An assessment of whether natural area planning arrangements of the area municipalities fit the framework in Figure 3 and the critical institutional arrangements is illustrated by a comparative matrix presented in the next section this report.

It is clear from the results of the analysis of institutional arrangements where the significant gaps lie in the planning system (Table 7). The Counties of Brant, Kent, and Elgin are major gaps in the movement toward landscape connectivity. These counties pose gaps because their planning arrangements are weak in identifying the significant natural areas and features that exist within their jurisdiction and in developing natural heritage protection policies. Also, these counties do not have the planning and management resources in place to develop the programs needed to undertake a comprehensive natural area strategy. These areas will require the assistance of local naturalist groups and other non-government organizations in preparing for such an undertaking. At the county planning level, these areas need to examine the official plans of neighbouring municipalities in order to develop comparable efforts at natural area conservation and land use planning.

The matrix indicates the municipalities which meet most of the criteria for natural heritage planning. These municipalities are: the Regions of Halton; Haldimand-Norfolk; Hamilton-Wentworth; and Waterloo; and the Counties of Lambton and Oxford, who all meet at least half the criteria (five out of ten). There are also the Counties of Essex, Middlesex, and the Region of Peel who meet fewer than half the criteria. The Rouge River Valley forms a special land use planning and conservation situation with an alliance of municipal planning jurisdictions. It should be noted that any system-wide planning that has been done under the auspices of other planning agencies which cover multiple municipal jurisdictions in the Carolinian Canada Zone region, such as the Grand River Conservation Authority Watershed Plan, has not been included in the matrix. It is intended only to cover and compare municipal planning arrangements for natural heritage protection.

Figure 2. Framework for Landscape Planning and Natural Heritage Strategies



Source: Adapted from Fleury and Brown (1997), Noss and O'Connell (1992), and Riley and Mohr (1994).

Table 7. Comparative Analysis of Institutional Arrangements in the Carolinian Canada Zone.

-	Criteria for Comparison					Implementation Strategy			
Municipality	Biophysical Inventory	Current Official Plan Status	EIA Procedure	Natural Heritage Database	Natural Heritage System And Mapping		Communication Strategy	EAC/ Management Committee	Land Stewardship Program
					Core Conservation Lands and Waters Identified	Potential Corridors Identified			
Brant County									•
Elgin County	•							•	•
Essex County	•				Biodiversity Conservation Strategy (in-progress)				
Halton Region	•	•	•		•	•		•	
Region of Haldimand-Norfolk	•	•	•		•			•	
Region of Hamilton-Wentworth	•	•	•	•	•	•		•	
Kent County	•								
Lambton County	•	•	•		•	•		•	
Middlesex County		•	•		•				
Region of Niagara	•								
Oxford County	•	•	•		•	•	•	•	•
Region of Peel	•	•			•	•			
Rouge River Valley	•	Park Management Plan							
Region of Waterloo	•	•	•		•			•	•

From such a comparison, a statement can now be made on the potential of area municipalities in the Carolinian Canada Zone to move towards regional landscape connectivity planning. About 1/2 of the Carolinian Canada Zone is prepared to move into the implementation phase of natural heritage planning. Upon closer examination, however, the issue is more complex. Those municipalities that are prepared are not located adjacent to each other in the landscape, resulting in significant gaps in natural area planning within the Carolinian Canada Zone. The main area exhibiting a gap is the central part of the Carolinian Canada Zone where most of the intensive agricultural land uses and loss of natural habitat is occurring. Kent and Elgin Counties have less than 3% forest cover and lack comprehensive and formal natural area and land use planning arrangements. This central region should be the target area for further land acquisition, restoration, and co-ordination and co-operation in land use planning and natural area conservation initiatives.

What can be done in Carolinian Canada to bring all municipalities to a similar level of natural area conservation on which landscape scale planning can be launched? Clearly, the identified gaps need to be addressed through close co-operation and communication with all municipalities. Independent, however, from action in the municipal planning arena, is necessary support from private landowners on whose lands many of the Carolinian Canada habitat is located.

> *"As we strive in the coming years to protect what is left of the Carolinian region, the key to it all will be the private landowner"* (Hilts, 1985, p.49).

Options intended for the protection of natural heritage on private land need to be publicized and made attractive to landowners. It is ultimately the citizens of southwestern Ontario who will be the managers of the natural heritage of this region for many years to come.

4. Land Stewardship in the Carolinian Canada Zone

Although a variety of land use planning institutions exist for the protection of natural heritage areas in Ontario, private land stewardship is increasingly seen as playing an important and complementary role in such an effort. With major changes in public policy and legislation occurring within the provincial government, the current planning system has clear limitations in ensuring the perpetuity of natural areas characteristic of the Carolinian Canada Zone. The current natural heritage conservation system in Ontario is also constrained by the allocation of fewer public resources directed towards protection of significant and threatened sites (Hilts and Reid, 1993). Undoubtedly, the fate of Carolinian Canada habitats in southwestern Ontario rests with a conservation strategy emphasizing increased connectivity and increased private stewardship. The purpose of this section of the report is to examine the variety of opportunities available for private stewardship of lands within the Carolinian Canada Zone, and to indicated how these methods form an essential component of a landscape approach to conservation.

4.1. What is Stewardship?

There is no one way to define *stewardship* in the context of natural heritage protection and land use planning. Stewardship may mean many things to the private landowners on whose lands Carolinian Canada sites are designated. It may also mean being actively involved in the conservation and wise management of their property (Hilts and Moul, 1990). Or it could be as simple as being concerned about the environment and wanting to become more aware of what they can do to ensure a legacy for the unique natural heritage in their holdings.

In the Carolinian Canada Program, stewardship of private lands is based on the landowner's contribution in:

- Maintaining and protecting the site to the best of their ability.
- Notifying agency representatives of:

1) planned land use changes that might threaten the natural heritage features,
2) other threats to the area, such as intensive lumbering or drainage, and
3) intent to sell or transfer ownership of the property.
(from Hilts and Moull, 1990, p.50)

Since the Carolinian Canada program began in 1984, landowners have entered into such agreements with land use agencies such as the Ontario Ministry of Natural Resources, Conservation Authorities, and the principal agency sponsoring such an initiative - the Natural Heritage League (NHL). Land stewardship agreements in Carolinian Canada form part of a larger project providing information and aims to encourage land care and assistance to landowners in protecting natural areas (Hilts, 1985).

4.2. The Natural Heritage Stewardship Program

The Natural Heritage Stewardship Program originated in 1984 independently of the Carolinian Canada Program. It began as a pilot landowner contact program launched by the NHL in response to trends occurring with respect to significant natural areas in Ontario. The NHL observed that " *traditional methods of protection, including acquisition and land use regulation through the planning process, were not always financially feasible or readily accepted by property owners* " (Hilts and Moull, 1990, p.50). In launching the landowner contact program and in initiating a formal process of private stewardship in Ontario, it seems the foresight of the NHL worked well to set the stage for what would become an essential part of regional conservation planning in southwestern Ontario. The purpose of the landowner contact program is:

- To allow an opportunity for the NHL to inform private landowners of a site's biophysical significance;

- To provide landowners with an opportunity to voice concerns about protecting their property through private stewardship;

- To provide conservation oriented agencies with background information on the nature of a site, in assisting with the development of appropriate protection strategies.
(from Hilts and Moull, 1990).

Meanwhile, the Carolinian Canada Program was launched and featured an opportunity under which the landowner contact program could be implemented. By 1990, 470 Carolinian Canada landowners were participating in the Natural Heritage Stewardship Program. They own approximately 5,400 hectares of significant natural area (Hilts and Moull, 1990).

The Natural Heritage Stewardship Program, however is more than simply the contacting of landowners and the dissemination of information. The Program, developed by researchers at the Department of Land Resource Science at the University of Guelph, represents a hierarchy of private stewardship techniques as well as a key component of the implementation stage of integrated natural heritage planning (Hilts and Moull, 1990). The Program feeds into a natural heritage stewardship process out of which has come a variety of tools for the protection of natural heritage on private land.

The private stewardship tools, many of which come with associated tax rebates, include: land trusts, stewardship agreements, management plans, leases, conservation easements, donation, and land acquisition (Hilts and Reid, 1993; Gonzalez, 1996). The differences between these tools lie in the amount and type of involvement by the management agency with which the agreement is made. Under no circumstances do any of these tools permit access to the properties by the public (Hilts, 1985).

The process also provides an excellent way for local non-government organizations to be actively involved in, and ultimately responsible for, securing conservation of significant private holdings of natural heritage within their area. Eventually, stewardship of such lands could lead toward the establishment of land trusts, which perform a variety of services and functions for both private landowners and the public. The Nature Conservancy of Canada and the Federation of Ontario Naturalists are two examples of non-government organizations that have had recognized success in working to acquire and preserve private lands of conservation importance (Hilts et al., 1986).

Although the Natural Heritage Stewardship Program has formed a key part of the Carolinian Canada protection and acquisition strategy during the last fourteen years, no systematic process had ever been applied to provide an overall picture of landowner concerns and needs in the region (van Hemessen, 1996). In the summer of 1996, a project to report on results of a landowner survey was made possible through funding from the Ontario Ministry of Natural Resources. The Landowner Survey Report (Petersen, 1996) summarised results from a study of the following variables:

- Demographics;
- Primary uses of the land;
- Activities on land;
- Knowledge about conservation programs in Ontario;
- Sources of information about land stewardship;
- Knowledge of the environment; and,
- Attitude toward land stewardship.

The report concluded that " *ignorance may be the greatest threat to our natural spaces in southern Ontario*" and that education of a technical nature is the key to future conservation projects in Carolinian Canada (Petersen, 1996, p.12). This statement supports the need for a communication strategy as part of the integrated natural heritage planning process.

5. Conclusions

In the context of natural heritage planning within the Carolinian Canada Zone, a range of planning and management tools is required. The threat of expanding urbanization and associated land use pressures is altering the landscape in southwestern Ontario so that the continued long term existence of the fragmented isolated protected natural heritage areas is uncertain. It has been necessary to examine the planning system and associated institutional arrangements for the protection of significant natural areas prior to considering a complex approach for natural connectivity planning in the Carolinian Canada Zone. Central to the concept of landscape planning for the protection of natural heritage was the review of conservation corridor theory and its origins in the disciplines of landscape ecology and conservation biology. Critical assessment of the concept of conservation corridors was made possible through a comprehensive literature survey highlighting both the advantages and limitations of the concept.

It is accepted that current pressures on the landscape in the Carolinian Canada Zone are proceeding at a faster pace than is the advancement of scientific thought and study in the fields of ecosystem science. This imbalance in our ability to resolve problems posed by human uses and their impacts on the

landscape signals a crisis toward which society is progressing. In Carolinian Canada, the saturation point probably has been reached. Society can no longer wait for scientific approval to dictate the course of action that must be taken to protect and conserve what little natural heritage remains in the region.

In the words of one of Ontario's leading ecologists:

> *"do those of us who care about things wild and free have to invoke scientific justification for saving even small remnants of the natural world around us?"* (Theberge, 1993, p.149).

It is time to reflect on how far science and existing planning arrangements have come in determining the most appropriate and timely way of addressing the biodiversity and extinction crisis. Critical thought and evaluation of practical applications of corridor planning must be put to work in real landscapes if society is to make any efforts at efficient means to conserve Ontario's natural heritage.

With regards to the institutional capabilities of municipalities to move towards a linked system of natural areas, the importance of co-operation and communication can not be over-emphasized. In conducting this investigation, it was quite clear that regional planners were both aware of the need for a landscape approach to conservation, and eager to be part of a study encouraging the concept. However, as seen by the results of this study, the current trend in municipal government is that of limited staff, funds, and knowledge about how to proceed in such a venture. The gaps in planning arrangements have been identified as have the model jurisdictions whose expertise in this matter is invaluable. It is time for all area municipalities in the Carolinian Canada Zone to join together in order to assist with the important task of undertaking a natural heritage planning approach.

It is not enough to operate within the current land use planning system in Ontario. Complementary methods for the protection of natural heritage on private land need to be further explored and promoted in the conservation community. Landowner contact in the Carolinian Canada Zone should be a natural area strategy, as many of the critical sites for protection are owned by private landowners. The government needs to recognize the contribution which private landowners make in the maintenance of significant natural areas in Ontario, and should continue to provide financial and other incentives to good private land stewards.

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Appendix

DATE: Thursday December 4th, 1997

TO: Distribution List

FROM: Cynthia Lussier, Research Assistant
Heritage Resources Centre

SUBJECT: The Status of Landscape Connectivity in Carolinian Canada

Greetings

The first annual *Carolinian Forum – "Working Together for Conservation* was recently held in London, Ontario. This event provided an excellent opportunity to learn about what conservation organizations and area municipalities have been up to with regards to the designated Carolinian Canada sites in their jurisdiction.

We, at the Heritage Resources Centre, were fortunate enough to attend the *Forum* and present a project we are launching in conjunction with Parks Canada. The aim of our project is to investigate the status of natural and land use planning connections between the 38 Carolinian Canada sites in Southern Ontario. We feel that this landscape connectivity exercise is important for the long-term protection of Carolinian Canada in that it considers the sites in the greater context of changing land use pressures in the region.

Three project tasks are currently underway:

1) Review and evaluation of existing land use planning arrangements for each sites and surrounding area.
2) Preparation of a Natural Areas Map for Carolinian Canada by digitizing the forest cover from the various 1:250,000 NTS maps for the region.
3) Evaluation of existing Greenway and Natural Area studies completed in Carolinian Canada by area municipalities and other planning agencies.

We are interested in any information that you may be aware of that could be of assistance to us. Attached is a list of *Questions of Interest* we have developed to facilitate and focus our investigation. We welcome any leads you may have in answering these questions, and we will be in contact with you in the coming weeks.

Please share this notice with interested colleagues! Any comments you wish to share regarding this initiative are welcome and should be directed to me.

Thank you for your time,

Cynthia Lussier
clussier@fes.uwaterloo.ca

Questions of Interest

What is the range of planning mechanisms used for conservation and protection of Carolinian Canada sites?

What methods have been used to identify and protect natural areas in Carolinian Canada?

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?

Are you aware of any land acquisitions related to the sites? Or, are you aware of any additional landowners participating in the Conservation Land Tax Reduction Program?

Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's, Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)

What natural area designations exist between Carolinian Canada sites that would allow for their connectivity? (Including utility corridors and waterways)

Contacts for *Carolinian Canada* sites

Essex County:
Dan Lebedyk, Essex Region Conservation Authority
T 519-776-5209 X409
F 519-776-8658
Ojibway Prairie
Canard River Kentucky Coffee-tree Woods
Big Creek Marsh
Oxley Poison Sumach Swamp
Cedar Cree
Middle Point Woods
Stone Road Alvar
Middle Island

Kent County:
Valerie Walsh, Lower Thames Valley Conservation Authority
T 519-354-7310
F 519-352-3435
Lake St.Clair Marshes
Sinclair's Bush

Alternate Contacts:
Allen Woodliffe, Ministry of Natural Resources - Chatham District.
Box 1168, Chatham On N7M 5L8
T 519-354-7340
F 519-354-0313

Lambton County:
Malcolm Boyd - Planner, County of Lambton
T 519-845-0801
F 519-845-3817
Port Franks Wetlands and Forested Dunes
Ausable River Valle
Plum Creek Upland Woodlots
Shetland Kentucky Coffee-tree Woods
Sydenham River Corridor
Walpole Island Indian Reserve

Middlesex County:
Steve Evans - Planner, County of Middlesex
T 519-434-7321
F 519-434-0638
Ausable River Valle
Sydenham River Corridor
Dorchester Swamp

Alternate Contacts:
Ian Wilcox/Steve Sauder, Upper Thames River Conservation Authority
T 519-451-2800
Dan Schaffer/Michelle Kanter, OMNR Stewardship Committee, Aylmer

Elgin County:
Kim Smale - General Manager, Catfish Creek Conservation Authority
Christine Depuwdt - Planner Catfish Creek Conservation Authority
T 519-773-9605
F 519-765-1489
Catfish Creek Slope and Floodplain Forest
(Springwater Forest)

Alternate Contact:
Hugh Guertz - Elgin County Tree Commissioner & Kettle Creek Conservation Area
Randy Mallard - Clerk, Malahyde Township
T 519-773-5344

Oxford County:
Lisa King, Upper Thames River Conservation Authority
T 519-451-2800
F 519-451-1188
Embro Upland Forest (Unopened 12th Woodlots)

Alternate Contact:
Craig Manley - Oxford County Planning Department
T 519-539-0015 x332

Regional Municipality of Haldimand-Norfolk:
Mary Elder - Regional Municipality of Haldimand-Norfolk Planning Department
T 519-587-4911
F 519-587-5554
Delhi Big Creek Valle
St.Williams Dwarf Oak Forest (this site is part of St. Williams Forestry Station)
Big Creek Valley - SouthWalsingham Sand Ridges
Oriskany Sandstone and Woodlands
Caistor-Canborough Slough Forest

Regional Municipality of Waterloo, and Brant County:
Wayne MacMillan, Grand River Conservation Authority
T 519-621-2763
F 519-621-4844
gsousa@grandriver.on.ca
Sudden Bog
Grand River Valley Forests and Spottiswood Lakes
Six Nations Reserve Forests

Regional Municipality of Hamilton-Wentworth:
Cathy Plosz - Planner, Regional Municipality of Hamilton-Wentworth
T 905-546-4348
F 905-546-2385
Beverly Swamp
Dundas Valle

Alternate Contacts:
Darcy Baker, Hamilton-Wentworth Conservation Authority re: Watershed Plan
Ben Vanderburg, HWCA re: Land Acquisition Program
Bruce Duncan, HWCA re: Restoration and Habitat Management

Regional Municipality of Niagara:
Brian McHattie, Remedial Action Plan
T 905-540-1441
grplanet@interlynx.net
Grimsby-Winona Escarpment and Beamer Valle
Jordan Escarpment Valle
Caistor-Canborough Slough Forest
Fonthill Sandhill Valle
Willoughby Clay Plain
Point Abino Peninsula Sandland Forest

Alternate Contacts:
Don Campbell - Environmental Planner, Regional Municipality of Niagara
T 905-984-3630
F 905-641-5208
Sue Holland, Geomatics International Inc.
T 905-336-6449

Regional Municipality of Halton:
Sue McInness - Planner, Regional Municipality of Halton
T 905-825-6161 X7214
F 905-825-8822
Sassafras Woods
Iroquois Shoreline Woods

Alternate Contacts:
John MacNeil - Forester, Town of Oakville
T 905-845-6601 Planning Dept. X3130
Dan Calmusky, Cumis Insurance
T 905-827-8894

Regional Municipality of Peel:
Dave Burnett - Peel Region Planning Department
T 905-791-9400 x4355

Rouge River Valley:
Gord Weedon, Rouge River Valley Park Superintendent
T 416-287-6843

Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Essex

Contact Information: Dan Lebedyk - Biologist, Essex Region Conservation Authorit
Telephone: (519) 776-5209 x409
Fax: (519) 776-8688
E-mail: erca@wincom.net
Mailing Address: 360 Fairview Ave. W., Essex, ON N8M 1Y6

Carolinian Canada Sites	Lead Agencies
Big Creek Marsh	
Canard River Kentucky Coffee Tree Woods	
Cedar Cree	
Middle Island	
Middle Point Woods	
Oxley Poison Sumach Swamp	
Stone Road Alvar	
Ojibway Prairie Remnants	

Official Plan Status: There is not as of yet a completed Essex County Official Plan, however, they anticipate the Natural Heritage section for the new plan to utilize the ERCA's Conservation Biodiversity Strategy as the basis for County natural heritage policy.

Site Designations:

- All Carolinian Canada sites in the Essex region are currently designated as regionall significant ESAs (Environmentally Significant Areas) by ERCA.
- Provincially Significant ANSIs include Big Creek Marsh, Cedar Creek, Stone Road Alvar, Ojibway Prairie Remnants, Oxley Poison Sumac Swamp, and Middle Island.
- Regionally Significant ANSIs: Middle Point Woods and Canard River Kentucky Coffee Tree Woods.

Mapping: A variety of information was compiled to construct the GIS database for the Conservation Biodiversity Strategy study area. The Canadian 1:50,000 and Ontario 1:10,000 topographic base mapping (drainage, raods, vegetation, etc.), and 1:25,000 OMAFRA Drainage maps have been obtained prior to the start of the project. ESA's and sub-watersheds were obtained from ERCA. ANSI's and Provincially Significant Wetland boundaries were obtained fro the OMNR. Soils and physiography data (1:63,360) were obtained from the OMAFRA. Forest cover and other landcover information will be obtained from Landsat Satellite images, through contacts at Parks Canada.

All digital information was imported into ARC/INFO-GIS, a GIS software package to conduct spatial analysis. A scale of 1:50,000 will be used only for a broad view of existing habitat in an area as a first attempt at identifying possible habitat rehabilitation areas. Detailed maps (1:10,000) will incorporate information gathered through research with Parks Canada, satellite imagery, 1:8000 aerial photography, and landowner contact and will provide the basis for the development of a habitat strategy for all five sub-watersheds, and specifically for priorit restoration areas. (Excerpt: Draft Conservation Biodiversity Strategy)

Related Works:

- **ERCA's Fill, Construction and Alteration to Waterways/Shorlands Regulations.**

- ERCA's **Environmentally Significant Area (ESA) program** - 1983 to present.
- MNR's **Area of Natural and Scientific Interest (ANSI) program** - 1984 to present.
- **Candidate Natural Heritage Site (CNHS) Biological Inventory and Environmental Polic** .
- Carolinian Canada Natural Heritage **Landowner Contact Program** - 1984 and 1994 (Intro attached).
- **Conservation Biodiversity Strategy for the Essex Region** (Habitat Restoration and Enhancement Guidelines and Priorities) - 1997 (in progress - Terms of Reference attached).
- **Essex Region Natural Areas Task Force** (NATF) - Adapting the Carolinian Canada Strateg to the Essex Region - 1997 (in progress - Terms of Reference and Minutes attached).

RESPONSE TO QUESTIONS OF INTERES

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?

All Carolinian Canada sites in the Essex region are currently designated as regionally significant ESAs (Environmentally Significant Areas) by ERCA. ERCA's ESA policies prescribe: that ERCA encourage development which may seriously alter the significant features of ESAs, to locate outside these ESAs; that ERCA continue to request member municipalities to recognize identified ESAs in their Official Plans and Zoning By-laws, and to adopt policies providing for their protection; that ERCA support member municipalities in the protection of ESAs through provision of available data, technical comments and assistance in preparation and presentation of planning documents; that ERCA have regard for ESAs in preparation of its comments in the municipal plan review process and in the consideration of applications submitted pursuant to ERCA's Fill, Construction and Alteration to Waterways/Shorlands Regulations, where the physical, hydrological or biological features of an ESA may be significantly altered by a development proposal, including a public work proposal; that ERCA may require the proponent to undertake an Environmental Impact Study; and that ERCA have regard to the protection of the significant physical, hydrological and biological feautres of ESAs, with respect to developments and projects on ERCA lands.

ANSIs (Areas of Natural and Scientific Interest - as designated by the MNR) may vary in level of significance. The most significant of these, those referred to as "Candidate Nature Reserves" make the greatest contribution to the Ministry's protection objective and are listed in the District Land Use Guidelines. Those Carolinian Canada sites in the Essex region which are considered to be Provincially Significant ANSIs include Big Creek Marsh, Cedar Creek, Stone Road Alvar, Ojibway Prairie Remnants, Oxley Poison Sumac Swamp, and Middle Island. ANSIs which contribute to a lesser degree to the provincial protection objectives are referred to as "Significant Sites" and are considered to be at least regionally significant. The following Carolinian Canada sites therefore can be considered Regionally Significant ANSIs: Middle Point Woods and Canard River Kentucky Coffee Tree Woods.

Planning Implications: Provincial Policy Statement for Natural Heritage states that development may be permitted within or adjacent to ANSIs only if it can be demonstrated that development does not negetively impact the features or the ecological functions for which the area is identified. An Impact Assessment is the recommended procedure for assessing impacts. See also answers to next question below.

What methods have been used to identify natural areas in your jurisdiction?

- ERCA's Environmentally Significant Area (ESA) program - 1983 to present (Contact: Dan Lebedyk, Biologist - ERCA).
- OPA's and ZBA's in the following municipalities: Colchester South, Anderdon, Windsor, LaSalle, Sandwich South.
- MNR's Area of Natural and Scientific Interest (ANSI) program - 1984 to present (Contact: Allen Woodliffe, Area Ecologist - MNR, Chatham Area Office).
- City of Windsor Candidate Natural Heritage Site (CNHS) Biological Inventory and
- Environmental Policy - 1992 to 1993 (Contact(s): Dan Lebedyk, Biologist - ERCA; Bruce Singbush, Planner - City of Windsor).
- Town of LaSalle Candidate Natural Heritage Area (CNHA) Biological Inventory and
- Landuse Planning Policy - 1996 to 1997 (Contact(s): Dan Lebedyk, Biologist - ERCA; Kevin Miller, Planner - Town of LaSalle).
- Carolinian Canada Natural Heritage Landowner Contact Program - 1984 and 1994 (Contact: Dan Lebedyk, Biologist - ERCA).
- Conservation Biodiversity Strategy for the Essex Region (Habitat Restoration and Enhancement Guidelines and Priorities) - 1997 (in progress) (Contact: Dan Lebedyk, Biologist - ERCA).
- Essex Region Natural Areas Task Force (NATF) - Adapting the Carolinian Canada Strategy to the Essex Region - 1997 (in progress) (Contact(s): Dan Lebedyk, Biologist - ERCA; Chris Allsop, NATF Chairperson).

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?

- Future OPAs and ZBAs in other municipalities to incorporate ESA policies.
- Adoption of the Conservation Biodiversity Strategy for the Essex Region (as outlined above) in new Essex County Official Plan, or new OPs as a result of future amalgamations or restructuring.

Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?

No new information on either point is currently known.

Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?

No changes have been identified. ERCA is one of the lead agencies which owns the majority of the lands in the following Carolinian Canada sites: Big Cree Marsh, Canard River Kentucky Coffee Tree Woods, Cedar Creek, and Stone Road Alvar.

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?

Recent changes to the Natural Heritage Policy have had the following negative impacts:

- weakening protection of significant natural areas by changing the requirement for municipalities from "be consistent with" to "have regard for" the Natural Heritage Policies.
- weakening protection of significant natural areas by changing the restriction on development from NO development within provincially significant ANSIs to development may be permitted as long as an Impact Assessment (IA) is completed demonstrating no negative impact.
- no guidelines on how to demonstrate no negative impact in IAs.
- Positive impacts as a result of Natural Heritage Policies include clearer definitions of significant natural areas and natural heritage values forprotection.

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)

Development pressure and increased agricultural expansion continues for lands in and adjacent to significant natural areas in the Essex region. Extensive agriculture in the Essex region, prohibits effective connectivity between natural areas.

What natural area designations exist between Carolinian Canada sites that would allaw for their connectivity? (incl. utility corridors and waterways)

None, with the exception of some waterways (currently designated "Natural Environment" (NE)) or the Greenway (abandoned CSX railway corridor), owned by ERCA. For the most part, all Carolinian Canada sites are too far separated from one another by vast expanses of agricultural lands to consider practical connectivity.

NATURAL HERITAGE FRAMEWORK	
Regional Municipality/County: Kent	
Contact Information: Allen Woodliffe, Ministry of Natural Resources - Chatham District. **Telephone:** (519) 354-7340 **Fax:** (519) 354-0313 **Mailing Address:** Box 1188, Chatham, Ontario N7M 5L8	
Carolinian Canada Sites	**Lead Agencies**
Lake St. Clair Marshes	Canadian Wildlife Service, Ministry of Natural Resources, Private Ownership
Sinclair's Bush	Lower Thames Valley Conservation Authority
Skunk's Misery	Lower Thames Valley Conservation Authority, Middlesex County
Official Plan Status: Currently no regional official plan.	
Site Designations: None	
Natural Heritage Study: • Bowles, J.M., M. Kanter, and R. Klinkenberg. 1990. **Summary Report on the Kent-Elgin Natural Areas Survey.** Pages 11-28, in, G.M. Allen, P.F.J. Eagles, and S.D. Price (eds.), Conserving Carolinian Canada. University of Waterloo Press. Field work completed in 1986. • Bowles, J.M., M. Kanter, R. Klinkenberg, and A. Woodliffe. 1994. Draft. **Significant Natural Areas of Kent County, Ontario 1985-1986.**	
Related Works: • **Statements of Conservation Interest** for all three sites. • Lake St. Clair Marshes: Canadian Wildlife Service Management Plan; Ducks Unlimited projects.	
NOTE: Investigation of the institutional arrangements in Kent County was not possible because little, if any, work has been done with regards to public protection of natural areas. Valerie Walsh from the Lower Thames Valley Conservation Authority was not aware of any protection designations offered to any of the Carolinian Canada sites in Kent County. Allan Woodliffe from the MNR - Chatham District was able to fax me a draft Table of Contents and excerpts from the draft report mentioned above, however advised me yet again that no work has been done since then.	

Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Lambton

Contact Information: Patrick Donnelly - Environmental Planner
Telephone: (519) 845-0801
Fax: (519) 845-3817
E mail: p2donnelly@orc.ca
Mailing Address: Planning and Development Department, Hwy. 21, Box 3000, Wyoming, On N0N 1T0

Carolinian Canada Sites	Lead Agencies
Port Franks Wetlands and Forested Dunes	
Ausable River Valle	
Plum Creek Upland Woodlots	
Shetland Kentucky Coffee-tree Woods	
Sydenham River Corridor	
Walpole Island Indian Reserve	

Official Plan Status: Proposed Lambton County Official Plan, August 1997

Site Designations:

- Ausable River Valley: Significant Natural Area (COP); Group B Feature (COP).
- Port Franks Wetlands and Forested Dunes: Significant Natural Area and Provinciall Significant Wetlant (COP); Group A Feature (COP.
- Shetland Kentucky Coffee Tree Woods: Significant Natural Area (COP); Group B Feature (COP).
- Plum Creek Uplan Woodlots: Significant Natural Area and Locally Significant Wetland (COP)
- Walpole Island Indian Reserve: Significant Natural Area and Provincially Significant Wetland (COP); Group A Feature (COP).
- Sydenham River Corridor: Significant Natural Area (COP)

Natural Heritage Study
Issue Paper No. 8 The Lambton County Official Plan: Lambton's Natural Heritage, November 1996.
Lambton County Resource Survey (1972).

Greenway Strategy: Natural Heritage System, 1997.

Mapping:

- **Natural Heritage System,** County Official Plan Map 2, July 1997.
- **Existing and Potential Natural Heritage Corridors,** County Official Plan Appendix Map A, August 1996.
- Mapping approaches described in Issue Paper No. 8.

Related Works:

- **Lambton County Preliminary ESA Stud** (1980).
- **Ausable-Bayfield Conservation Authority ESA Study Update** (1994).
- County of Lambton **Trees Act By-law, 1991.**
- **County Forest Management Plan.**
- Section 8.1.3 of the County Official Plan encourages landowners to develop **Woodlot Management Plans.**

- Section 8.1.4 of the COP supports implementation of the **St.Clair River Remedial Action Plan** and Conservation Authorit **Shoreline Management Plans.**
- Section 8.1.5 of the COP encourages implementation of **Fill, Construction, and Alteration to Waterway Regulations** by Conservation Authorities.

RESPONSE TO QUESTIONS OF INTERES

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?

- *County Official Plan Natural Heritage System:*
  a network of natural heritage corridors which recognize the individual features, the functions they possess and their connections to one another (County Official Plan, 1997).

  Goals: To identify, protect and restore the County's Natural Heritage Corridors; To recognize and protect Significant Natural Areas; To promote and protect the biodiversit of species found within the ecosystems in the County.

  Significant Natural Areas Designations
  Provincially Significant Wetlands
  Threatened and Endangered Species Habitat (portions)
  ANSI's
  ESA's
  Great Lakes System shorelines
  Significant Woodlots
  Significant Valley Lands
  Significant Wildlife Habitat
  Prairie Grasslands
  Locally Significant Wetlands
  Natures Reserves
  Fish Habitat

- *Group A Features, Group B Features, Group C Features.*
- *Provincial Policy Statement*
- *Local Official Plans*
- *Zoning By-Laws*
- *Committee of Adjustment*

What methods have been used to identify natural areas in your jurisdiction?

- *County Official Plan*
- *Local Official Plans*
- *Tree Cutting By-law*
- *County Forest Management Plan.*
- *Issue Paper No. 8. Section 3 - Natural Heritage Features in Lambton County.*
- *Lambton County Preliminary ESA Study (1980).*
- *Ausable-Bayfield Conservation Authority ESA Study Update (1994).*

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?

- New County Official Plan being finalized which uses a corridor approach to protect all CC sites in County.
- The recent County Official Plan will be used to update 19 local official plans to ensure that they conform with it and the provincial policy statement on natural heritage.

Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?
No.

Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?
Not that they are aware of.

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?
Only impact noticed so far is the difficulty in getting and updating information from restructured government and agency offices.

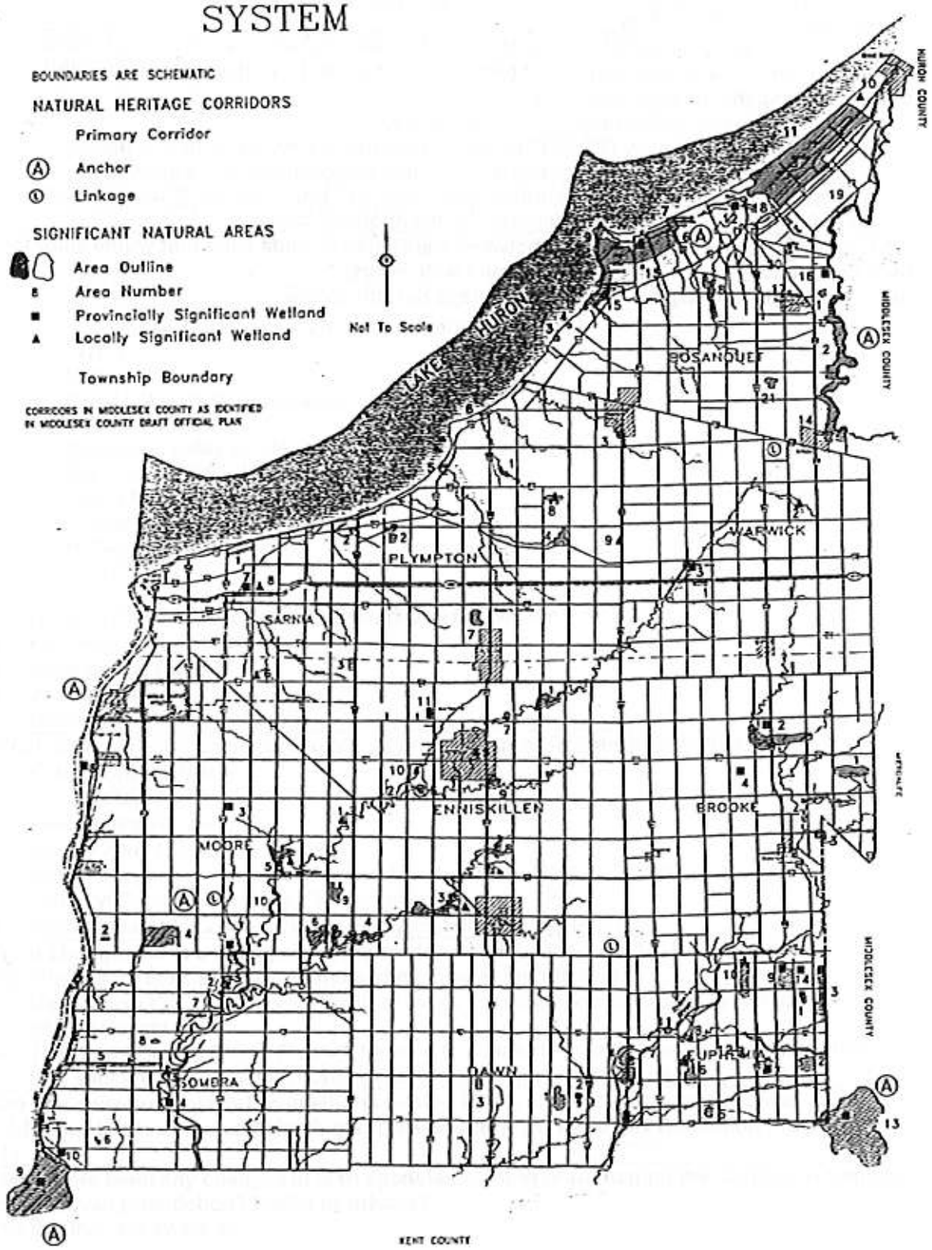
Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)

- Oil and gas pipeline routes proposed in some areas.
- Section 8.3.3 of the County Official Plan requires the use of Environmental Evaluations in assessing land development proposals for lands that encroach into or are adjacent to Provincially or Locally Significant environmental features. Environmental Evaluations will be guided by 3 stages, and must be approved by the Approval Authority.

What natural area designations exist between Carolinian Canada sites that would allow for their connectivity? (incl. utility corridors and waterways)
Areas identified and designated in Natural Heritage System, Map 2.

COUNTY OF LAMBTON
OFFICIAL PLAN
NATURAL HERITAGE SYSTEM

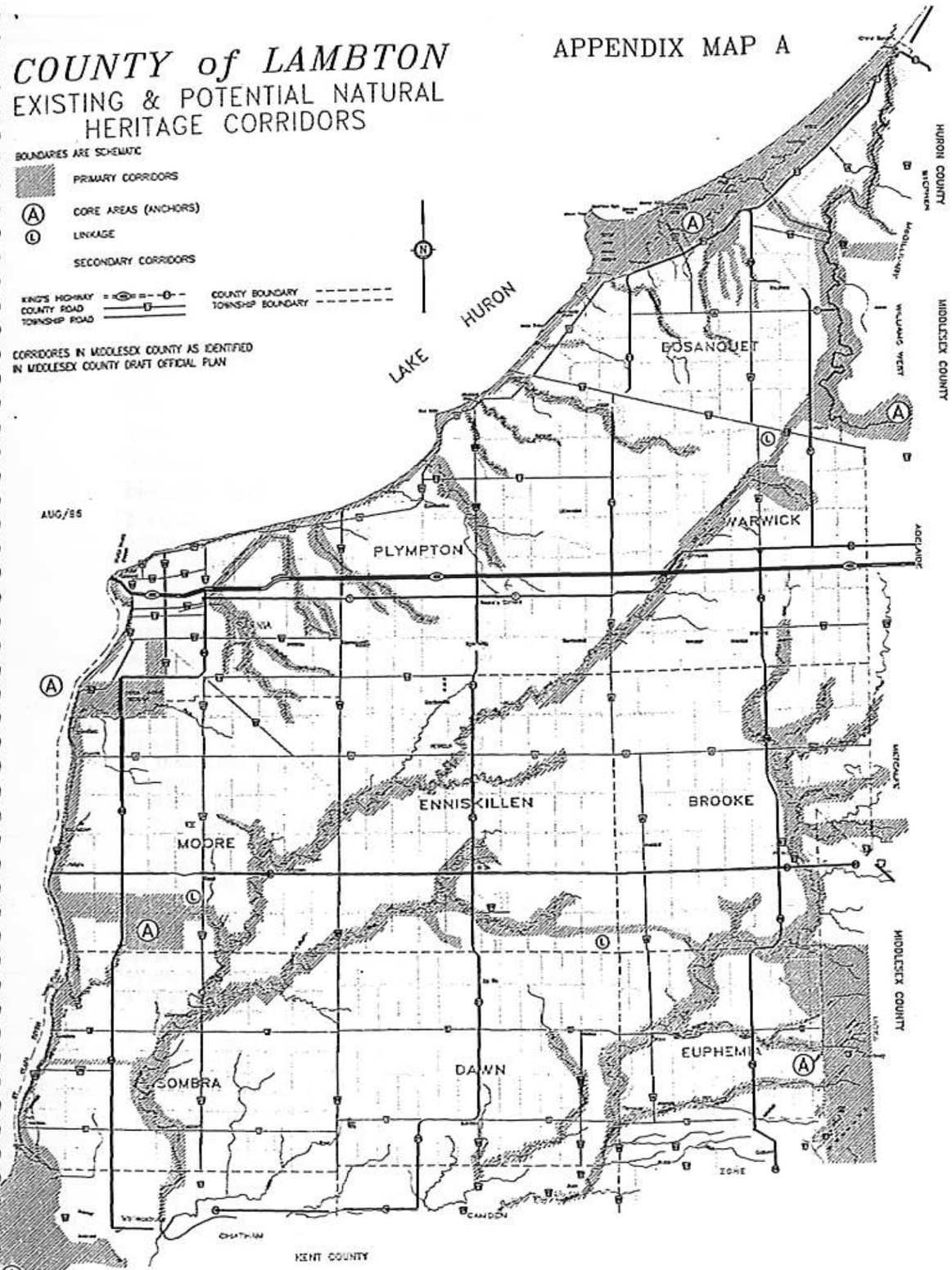
MAP 2



COUNTY OF LAMBTON PLANNING DEPT. JULY 14, 1987.

APPENDIX MAP A

COUNTY of LAMBTON
EXISTING & POTENTIAL NATURAL HERITAGE CORRIDORS



Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Middlesex

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Carolinian Canada Sites	Lead Agencies
Ausable River Valle	
Sydenham River Corridor	
Dorchester Swamp	UTRCA

Official Plan Status: Middlesex County Official Plan, September 1997.

Site Designations:
Ausable River Valley: ANSI
Sydenham River Corridor: PS
Dorchester Swamp: PSW, partial ANSIs.

Natural Heritage Study: None mentioned.

Greenway Strategy: System of County Natural Heritage Features and Natural Hazards.

Mapping:
- **Natural Heritage Features** - Schedule C Middlesex County Official Plan, 1997 (1:315,000).
- **Forest Patch Map** produced by the County and OMNR, January 1998 (1:315,000; Minimu 2ha included; 1993 satellite image used).

Related Works:
- **Dorchester Swamp Management Plan,** Middlesex County, Carolinian Canada, and Upper Thames River Conservation Authority.
- **Forest Management Plan,** Mosa Township.
- Middlesex Count **Tree-Cutting By-la** .
- **Development Assessment Report** (DAR) required for any development application within lands designated Natural Environment Areas - Schedule A and may be required within Natural Heritage Features - Schedule C.
- Informal: Middlesex Woodlot Committee, Local Environmental Groups, Field Naturalitsts.

RESPONSE TO QUESTIONS OF INTERES

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?
- Section 2.2 - Resource Management and 3.4 - Natural Environment Areas of the Middlesex County Official Plan, approved September 1997.
- *Official Plan Designations*
  Floodplains
  Hazard Lands
  Wetlands (Class 1-7)
  ANSIs
  ESAs
  Woodlands
  River, Stream, Ravine and Upland Corridors
  Endangered and Threatened Species Habitat

- **Dorchester Swamp Management Plan**, by Middlesex County, Carolinian Canada, and Upper Thames River Conservation Authority.

What methods have been used to identify natural areas in your jurisdiction?
Natural Heritage Features - Schedule C, 1997.
Forest Patch Map, 1998 to clearly identify connections between natural areas.

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?
Municipalities will have to bring their official plans and by-laws up to par with County Official Plan.

Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?
No.

Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?
No.

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?
Middlesex County consists of 19 municipalities (Townships, Villages, Towns, and Cities). Amalgamations will began in January 1998 for City of London, Delaware, and Lobo Townships to form Middlesex Centre. Municipalities will have to bring their official plans and by-laws up to par with County Official Plan.

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)
No.

What natural area designations exist between Carolinian Canada sites that would allaw for their connectivity? (incl. utility corridors and waterways)
- Thames River ANSI - Eckford Township.
- Skunks Misery ANSI, Agreement Forest, PSW - Mosa Township.
- Others so designated in **Natural Heritage Features** - Schedule C.

COUNTY OF MIDDLESEX
OFFICIAL PLAN
SCHEDULE C
NATURAL HERITAGE FEATURES

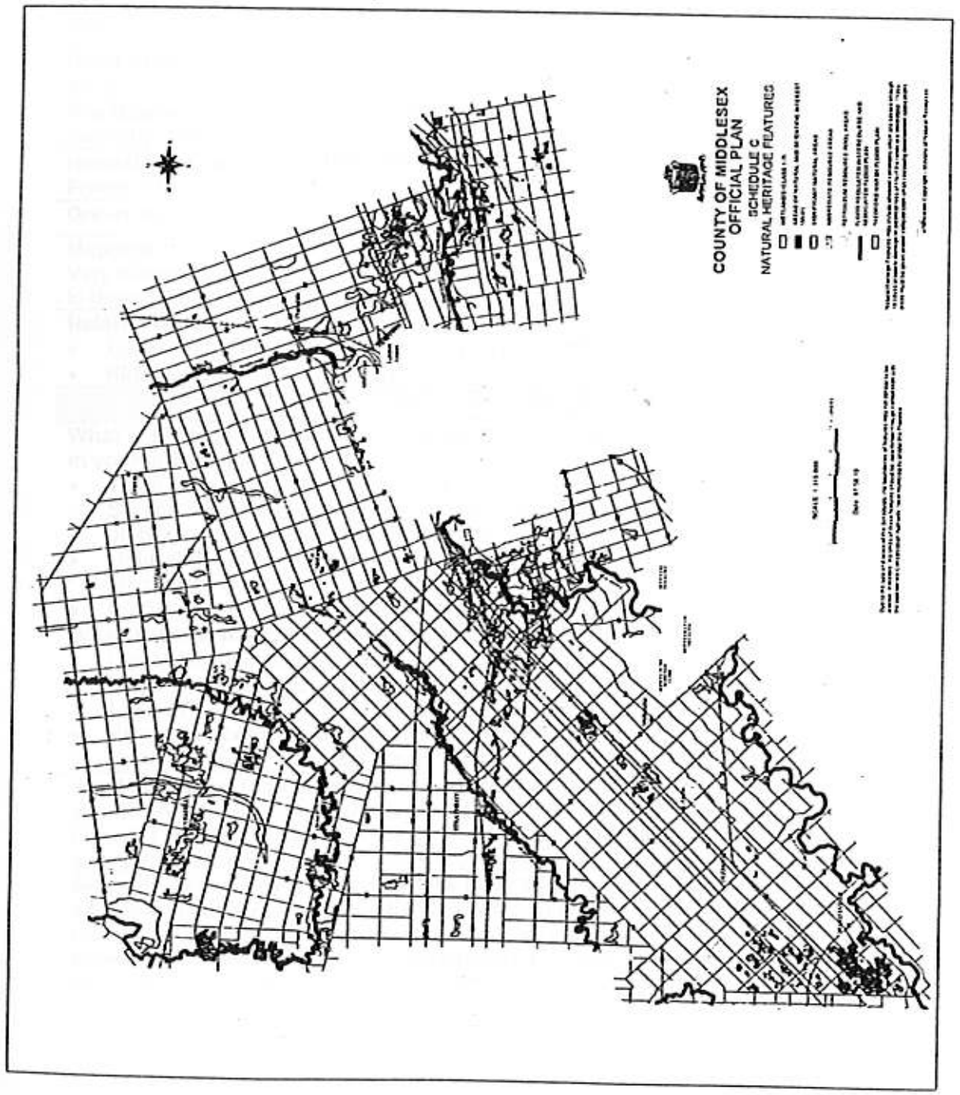
NOTATIONS:

Schedule C should be read in conjunction with Schedules A and B and the text of the Official Plan.

The features shown on Schedule C represent a range of ecosystem elements which have been consolidated from a number of existing sources. Schedule C features do not preclude development; however, there is an interest in protecting them from incompatible development. The features have been shown on Schedule C as a means of reinforcing the policies outlined in the text which encourage that the importance and ecological context of the feature be considered when land use changes and development decisions are considered.

The following Sections of the Official Plan provide policies related to the features shown on Schedule C:

Wetlands	Section 3.4.4.1
ANSI's and Significant Natural Areas	Section 2.2.1
Aggregate Resources	Section 2.2.3
Petroleum Resources	Section 2.2.4
Floodregulated Watercourses and Associated Floodplains	Section 2.2.1.3
Policies related to the Development Assessment Report (DAR)	Section 2.2.1.2



Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Elgin

Contact Information: Kim Smale, General Manager; Christine Depuwdt, Planner.
Telephone: (519) 773-9605
Fax: (519) 765-1489
Mailing Address: Catfish Creek Conservation Authority, R.R.#5, Aylmer, On N5H 2R4

Carolinian Canada Sites	Lead Agencies
Catfish Creek Slope and Floodplain Forest	CCCA

Official Plan Status: No County Official Plan, and Township Official Plans and By-Laws are quite dated.

Site Designations: Recommendation for site to be considered as an ANSI in Life Science Inventory, 1988.

Natural Heritage Study: Life Science Inventory of Catfish Creek Slope and Floodplain Forest, 1988.

Greenway Strategy: None.

Mapping:
Very little mapping has been done in the watershed. CCCA is currently working with the UTRCA to do some mapping.

Related Works:
- **Landowner Contact Program Survey Report, 1988.**
- **Elgin County Tree-Cutting By-Law.**

RESPONSE TO QUESTIONS OF INTERES

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?
- There is currently no County Official Plan, although County and Townships must adhere to Section 2.3 of the Planning Act which states that Natural heritage features and areas will be protected from incompatible development.
- **Natural Heritage Stewardship Agreement & Natural Heritage Stewardship Awards** with private landowners.
- Catfish Creak Slope and Floodplain Forest **Landowner Contact Program, 1994.**

What methods have been used to identify natural areas in your jurisdiction?
- **Life Science Inventory of Catfish Creek Slope and Floodplain Forest, Elgin Count** prepared in 1988 by Jeff Kaiser - Consulting Biologist 2744 Hollington Cres., Mississauga, On L5K 1E7.
- ESA's have been identified and mapped by CCCA Study.
- Township Official Plans and Zoning By-law restrictive designations (areas mapped).

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?
Current Township Official Plans and By-laws for this area are quite dated. With recent municipal amalgamations, updates or new plans may develop with more protection policies for CC sites.

Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?
No. There are eight private landowners, 6 of which participate in the Natural Heritage Stewardship Agreement, 7 of which have received Natural Heritage Stewardship Awards, and only 1 of which is participating in the CLTRP.

Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?
No.

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?
There were seven townships in the Catfish Creek Watershed. Following municipal amalgamation in January '98 there will be five townships. With recent municipal amalgamations, updates or new plans may develop with more protection policies for CC sites.
CC sites within this watershed are not currently subject to intense development pressures, subsequently, changes to provincial policies have not resulted in much of an impact.

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)
- Factors restricting conservation planning in jurisdiction is lack of County Official Plan, lack of fill regulations, lack of floodplain regulations.
- Severances creating rural building lots next to CC sites.
- New homes being constructed near wildlife corridors.
- Some private properties surrounding CC sites have been sold and it is not yet known whether new owners are good stewards.
- Some logging occuring on private properties. Logging must follow the **Tree-Cutting By-La** in place in Elgin County. Contact: Hugh Guertz - Tree Commissioner c/o Kettle Cree Conservation Authority R.R.#8 St. Thomas, On N5P 3T3 (519) 631-1270.

What natural area designations exist between Carolinian Canada sites that would allaw for their connectivity? (incl. utility corridors and waterways)
- Conservation Areas: Springwater Conservation Area (ANSI), Archie Coulter Conservation Area, Ward McKenna Conservation Area, Ivan Steen Conservation Area, Brown Conservation Area, Calton Swamp (Class 1 Wetland), Dalewood Conservation Area, Lake Whittaker Conservation Area. Mostly independent parcels of natural area close to riparian corridors.
- Agreement Forests.
- Port Burwell Provincial Park.
- Main riparian connections are Bradley Creek and Catfish Creek.

Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Oxford

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Carolinian Canada Sites	Lead Agencies
Embro Upland Forest	UTRCA

Official Plan Status: Oxford County Official Plan, 1995.

Site Designations: ANSI; Class 7 Wetland; Official Plan Environmental Protection designation; Zoned as general agriculture.

Natural Heritage Study
- Biophysical Inventor
- Wetland Inventor
- **Oxford County Terrestrial Ecosystems Stud** (OCTES), September, 1997, by UTRCA, County of Oxford, and Grassroots Woodstock.

Mapping: Oxford County Official Plan, 1995.

Related Works:
- Statement of Conservation Interest, UTRCA.
- Tree Cutting By-law

RESPONSE TO QUESTIONS OF INTEREST

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?
County Official Plan designations, 1995.

What methods have been used to identify natural areas in your jurisdiction?
Oxford County Terrestrial Ecosystem Study, 1997.
Geographic Information Systems.

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?
None.

Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?
- Not sure.
- As part of the OCTES, a landowner survey was conducted by a masters student at the University of Guelph. Questionnaires were mailed to 180 landowners in the Study and an additional 16 landowners were interviewed to gain a more in-depth perspective. The results of the survey indicated that landowners value their woodlots and are interested in conservation. Conservation efforts directed by the landowner are preferred to "top-down" approaches.

Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?
Not recently.

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted,

either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?

- Discontinued funding from Province for the acquisition of land.
- Tax exemption on Provincially Significant lands only.

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)

Always.

What natural area designations exist between Carolinian Canada sites that would allaw for their connectivity? (incl. utility corridors and waterways)

Unknown.

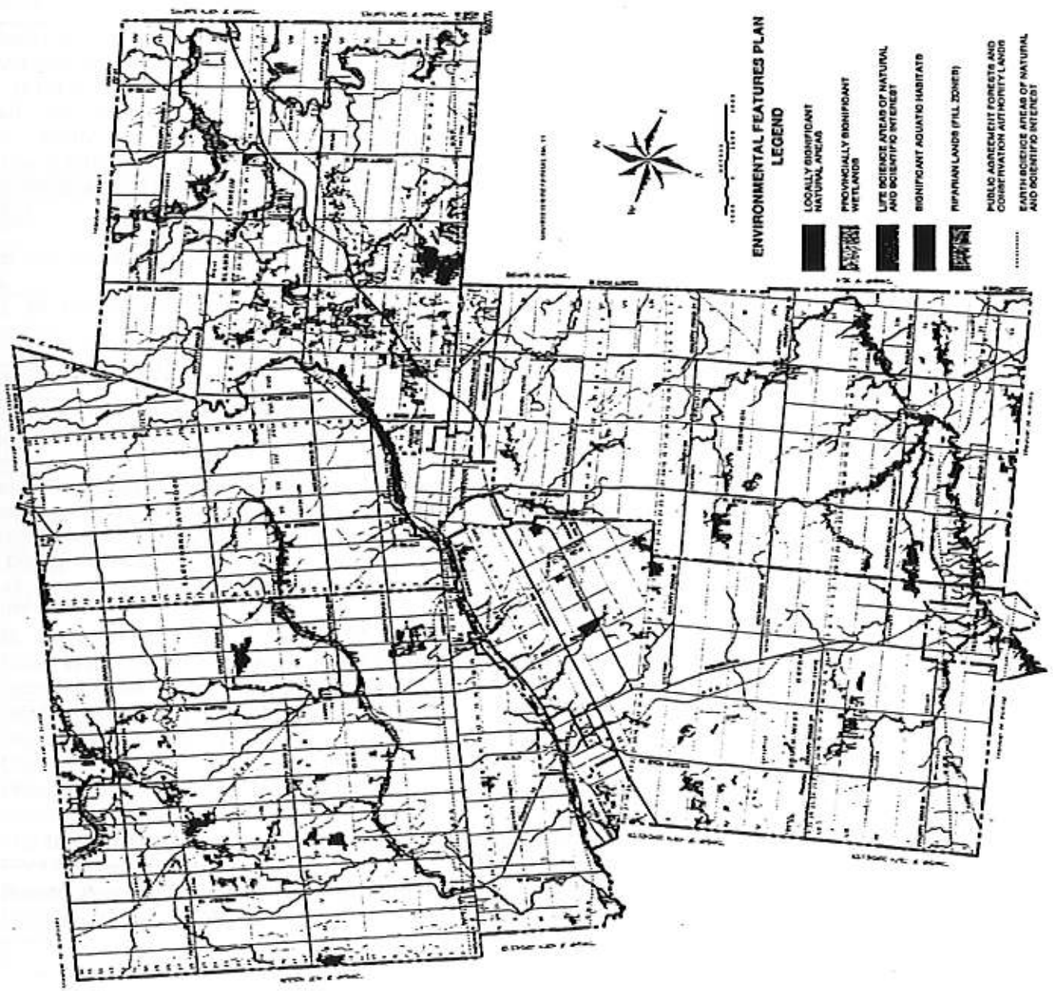
SCHEDULE "C-1"

COUNTY OF OXFORD

ENVIRONMENTAL FEATURES PLAN

COUNTY OF OXFORD

OFFICIAL PLAN



Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Haldimand-Norfol

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Carolinian Canada Sites	Lead Agencies
St. Williams Forest Station	
South Walsingham Sand Ridges - Big Cree Valle	
Delhi - Big Creek Valle	
Oriskany Sandstone and Woodlands	
Caistor-Canborough Slough Forest	
Alternate slough forest sites: North Cayuga Slough Forest and Attercliffe Station Slough Forest	

Official Plan Status: Haldimand-Norfolk Regional Official Plan, March 1997.
Amendments: The Region would like to do some modification to the plan by amendment to bring the terminology in line with the 1996 Provincial Policy Statement.

Site Designations:

- All of the sites including the alternate sites have been designated as **Significant Biotic Areas** (ROP).
- St. Williams Forest Station: PSW, ESA, CC.
- South Walsingham Sand Ridges and Big Creek Flood Plain: PSW, ANSI, ESA, CC.
- Delhi-Big Creek Valley: PSW, ANSI, ESA, CC.
- Oriskany Sandstone and Woodlands: PSW, ANSI, ESA, CC.
- North Cayuga Slough Forest: PSW, ANSI, ESA, Alternate CC.
- Caistor-Canborough Slough Forest: PSW, ANSI, ESA, CC.
- Attercliffe Station Slough Forest (Alternate): PSW, ANSI, ESA, Alternate CC.

Natural Heritage Study

- **The Natural Areas Inventory of the Regional Municiaplity of Haldimand-Norfolk,** Norfolk Field Naturalists, 1987.
- **Natural Areas and Wetlands Background Paper,** Regional Municipality of Haldimand-Norfolk, February 1993.

Mapping:

- Schedule 2 - Significant Biotic Areas (ROP), 1997.
- Appendix B - Watersheds (ROP), 1997.

Related Works:

- **Natural Areas and Wetlands Terms of Reference,** Regional Municipality of Haldimand-Norfolk, January 1993.
- **Technical Advisory Committee** (Terms of Reference) composed of: OMNR, NPCA, GRCA, LPRCA, Norfolk Field Naturalists, Haldimand Organization for a Pure Environment, the Natural Area Inventory Project Manager, Haldimand Federation of Agriculture, Norfol

Federation of Agriculture, Christian Farmers Association.

RESPONSE TO QUESTIONS OF INTERES

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?
All of the sites including the alternate sites have been designated as **Significant Biotic Areas** in the Regional Official Plan and each of the six new area municipality official plans as they are being developed (Schedule 2). A copy of **part I, Biota**, from the **Haldimand-Norfolk Regional Official Plan** has been sent by mail for your further information. (Please note the draft plan was written before the Comprehensive Provincial Policy Statements, revised as a result of them, Regional Council approved the plan in September 1995, then the 1996 Provincial Polic Statement was developed, then Ministry approval for the ROP was obtained and the plan came into effect March 11, 1997. We would like to do some modification to the plan by amendment to bring the terminology in line with the 1996 Provincial Policy)

Significant Biotic Areas
Provincially Significant Wetlands
ANSI's
Habitat of Endangered, Threatened and Vulnerable Species
Fish Habitat
Carolinian Canada Sites
ESA's

Significant Biotic Areas (not yet identified)
Significant Woodlands
Significant Ravine, Valley, River and Stream Corridors
Significant Natural Corridors and Links
Shorelines of Lakes, Rivers or Streams
Significant Wildlife Habitat

Environmental Impact Studies are required when development is proposed within or adjacent to Significant Biotic Areas. More detailed large scale mapping is available from our offices.

Policy 23 encourages promotion of private stewardship by various groups such as conservation authorities or naturalist groups.

The Town of Haldimand designated wetlands in its district plan and added a wetland zone in its zoning by-law.

What methods have been used to identify natural areas in your jurisdiction?
A **Technical Advisory Committee** was set up to discuss how to protect all the different types of natural areas and how to define them. (Terms of reference are coming in the mailed package.) After those discussions it was agreed that different types of natural areas would need to be listed and mapped but one title for them all was necessary. Policy staff coined the phase "Significant Biotic Areas". Council agreed to it.

Mapping was obtained from the originator of the natural area protection program to identif candidate natural areas. For example, we used the Carolinian Canada sites as set out in Conserving Carolinian Canada and a more detailed book which Jim Oliver of the Long Point Region Conservation Authority loaned to us to define the boundaries of the Carolinian Canada sites.

All wetlands were included within the Long Point Region Conservation Authority fill lines. The Town of Haldimand passed an interim control by-law in order to protect their wetlands. This gave them time to prepare an official plan amendment and zoning by-law amendment. The Region designated the natural areas in the new Regional Official Plan and through policy required that they be designated in the new area municipality official plans.

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?
The Town of Haldimand is the last area municipality to develop its new official plan. It is anticipated that they will include the Carolinian Canada sites in protected areas in their plan. All six area municipalities will soon begin a program to update their zoning by-laws. It remains to be seen if they will all put wetlands in a protective zone of their own. Planning staff do not expect that they will place Carolinian Canada sites in a protective zoning category as there is no provincial directive to do so.

Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?
The Lower Grand River Trust has obtained a significant portion of the South Cayuga Slough Forest connected with Ruthven. I have not been able to ascertain if there are additional landowners participating in the Conservation Land Tax Reduction Program. I have gotten more calls in the past two years from land owners inquiring whether or not a woodlot is classed as significant by the Region.

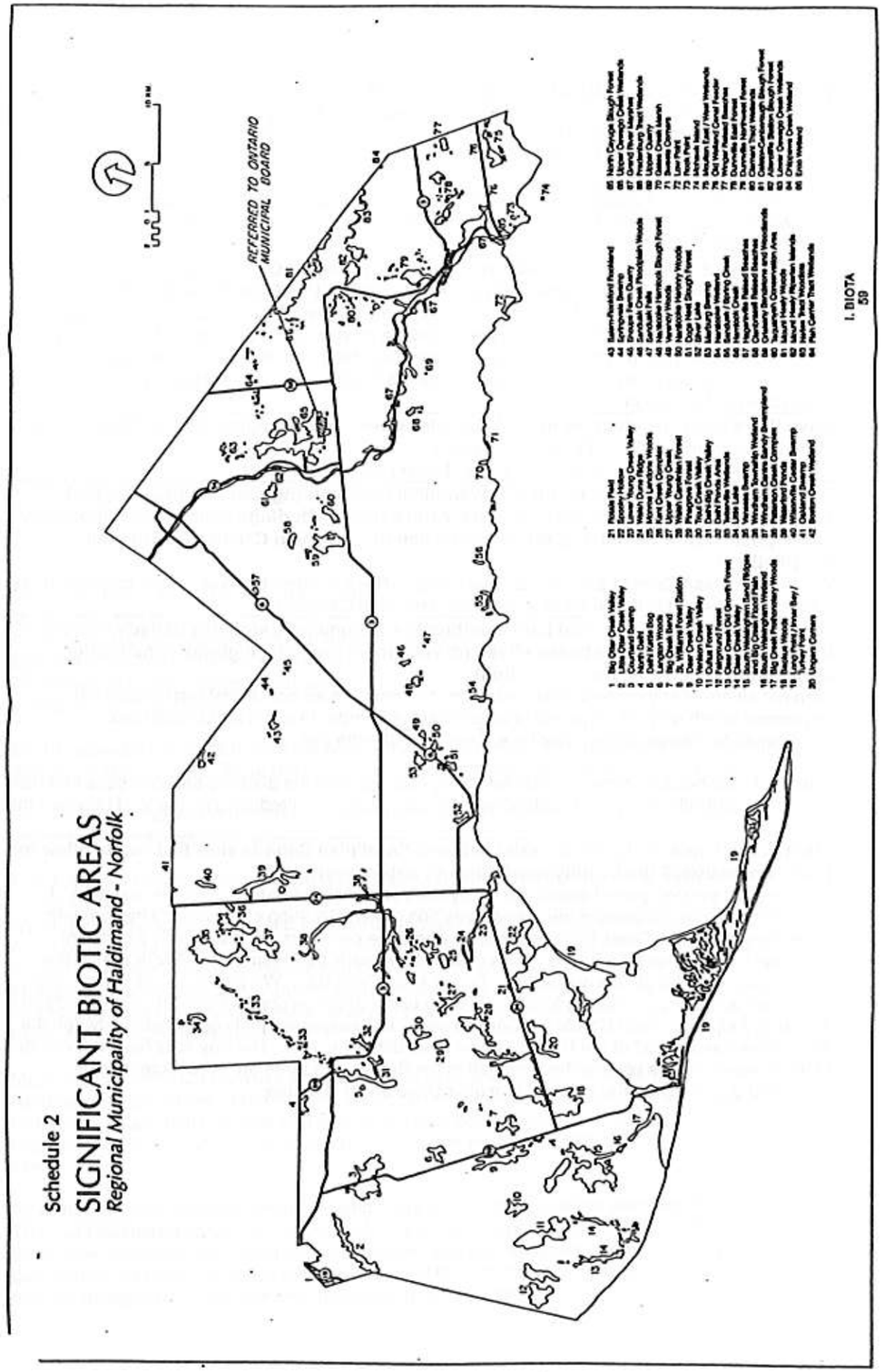
Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?
Only the above mentioned acquisition by the Lower Grand River Trust.

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?
Where Carolinian Canada sites are also wetlands, ANSI's or other types of natural heritage areas it has added weight to the need to protect the Carolinian Canada site.

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)
I am not aware of any proposed land use threats other than an occasional rural residential severance which may be proposed in wooded areas in order to avoid agricultural land. Sometimes that wooded area may be a Carolinian Canada site.

Barriers to connectivity were established a long time ago with the distance between sites and their location in agricultural areas. Establishing agriculture uses required clearing the land between the sites.

What natural area designations exist between Carolinian Canada sites that would allaw for their connectivity? (incl. utility corridors and waterways)
We have not yet designated significant valleylands or significant natural corridors and links. I have enclosed maps showing the watersheds and general location of the sites. Linkages are quite likely along Big Creek Valley especially when one considers the provincially significant wetlands located along the length of this cold water stream, the deep river valley in the Norfol Sand Plains and the affects on the Inner Bay of Long Point Bay. We also have not designated significant woodlands. This work will likely bring to our attention connections between woodlands. This may help to connect Carolinian Canada sites. It is suspected that connections between the sites in the eastern half of the Region will be more difficult to find. The clay soils have not resulted in the deep valleys as seen in the west half of the Region and there are lower acreages of woodland due in part to the types of farming carried out in this area.



Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Waterloo
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Mailing Address: Grand River Conservation Authority 400 Clyde Rd. P.O. Box 729 Cambridge, Ontario N1R 5W6

Carolinian Canada Sites	Lead Agencies
Sudden Bog	GRCA, OMNR
Grand River Valley Forests and Spottiswood Lakes	GRCA, OMNR
Beverly Swamp (portion)	GRCA

Official Plan Status: Planning for a Sustainable Community - Regional Municipality of Waterloo Official Policies Plan, January 1996 Consolidation. Township of North Dumphries Official Plan (Chapter 6 - Environmental Management, p.57-70), adopted by Council August, 1997.

Site Designations:
- Sudden Bog: Environmental Preservation Area; ESPA; (OP)
- Grand River Forests: Environmental Preservation Area; ESPA; (OP)
- Beverly Swamp: Environmental Preservation Area; ESPA; (OP)
- Spottiswood Lakes: Statement of Conservation Interest, GRCA.

Natural Heritage Study
Greenway Strategy:
- **The Natural Habitat Network,** Regional Official Plan, 1996.

Mapping:
- **Natural Habitat Network,** Map No. 1, Regional Official Plan, 1996.
- **Provincially Significant Wetlands,** Map No. 2, Regional Official Plan, 1996.

Related Works:
GRC
- **Proposed Grand River Corridor - Carolinian Sites,** prepared by Wayne MacMillan.
- **Successful Initiatives of the Carolinian Canada Program,** Environmental Services Report, prepared by Wayne MacMillan, July 1993.
- **Grand River Watershed Management Plan.**

Natural Heritage Committee and Working Groups
Fisheries Working Group
Forestry Working Group
Wildlife Working Group
Natural Heritage Specialists Working Group
Environmental Planners Working Group
Adjacent Conservation Authorities Working Group
Cooperating Agencies Working Group

- **The Grand Strategy for Managing the Grand River as a Canadian Heritage River,** Januar 1994.
- **Landowner Contact Summary.**
- **Statement of Conservation Interest for Grand River Forests-Spottiswood Lakes,** prepared by GRCA and OMNR, June 1990. **(ADD MORE LATER)**
- **Natural Heritage Committee Information Sheets No. 1 - 3,** February, 1997.

Region of Waterloo

- Regional Municipality of Waterloo **Ecological and Environmental Advisory Committee** (EEAC), established 1977.
- Watershed Planning Policy (OP).
- Environmental Impact Statement Policy (OP).
- Biodiversity Policy (OP).
- Land Stewardship Policy (OP).
- State of the Environment Reporting (OP).
- Regional Tree-Cutting By-law.

RESPONSE TO QUESTIONS OF INTERES

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?

- **The Natural Habitat Network** (see Maps No. 1 and 2).

The Natural Habitat Network proposes strategies to link designated areas with other natural habitats into a network which permits the relatively unhindered movement of native organisms while accommodating the needs of the human population. The principles of the Network are to protect and enhance significant natural areas, re-establish linkages across fragmented landscapes, and continue to enhance essential ecological features, functions, and processes.

The Network consists of the following components and subsequent criteria:

- *Environmental Preservation Areas;*
  - Provincially Significant Life Science ANSI's;
  - Significant portions of habitat of endangered species;
  - Significant portions of habitat of threatened species.

- *Environmentally Sensitive Policy Areas (ESPA's)*
  - Regionally Significant Life Science ANSI's or Provincially Significant Earth Science ANSI's;

  Fulfil at least two of the following criteria:
  - Ecological communities of unusual, outstanding quality, or regionally, provincially, or nationally representative.
  - Critical uncommon/remnant habitats - old growth forest, forest interior habitat, Carolinian forest, prairie-savanna, bogs, fens, marl meadows, and cold water streams.
  - Interior forest habitat (>20ha).
  - Habitat of national, provincial, regional significance.

  Fulfil one of the above and two of the following criteria:
  - Unusual diversity due to topography, microclimates, soils, drainage regimes.
  - Perform vital ecological function (hydrological balance, storage, discharge, recharge area).
  - Provide linking system between forest patches or other natural habitat.
  - Serve as major migratory stop-over.
  - Contain unusual/representative landform.

- *Provincially Significant Wetlands;*
- *Floodplains;*
- *Environmentally Sensitive Landscape;*
- *Significant natural corridors;*
- *Sensitive groundwater recharge areas, head waters and aquifers;*
- *Significant woodlands;*
- *Locally significant natural areas; and,*
- *Fish habitat.*

- Section B: Environmental Stewardship, Regional Municipality of Waterloo Official Plan, 1996.
- ,Policies: EEAC, Watershed Planning, Environmental Impact Statements, Biodiversity, Land Stewardship, State of the Environment Reporting.

North Dumphries Township

Chapter 6 - Environmental Management in the North Dumphries Official Plan protects Environmental Areas from incompatible development. Environmental Areas are defined as:

- Environmental Preservation Areas
- Environmentally Senstive Policy Areas
- Provincially Significant Wetlands
- Fish Habitat
- Significant Natural Corridors
- Sensitive Groundwater Recharge and Discharge Areas, Headwaters and Aquifers
- Locally Significant Natural Areas
- Significant Woodlands.

What methods have been used to identify natural areas in your jurisdiction?

- **Implementation Guideline for Environmentally Sensitive Policy Areas**, Regional Official Plan, 1996.

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?

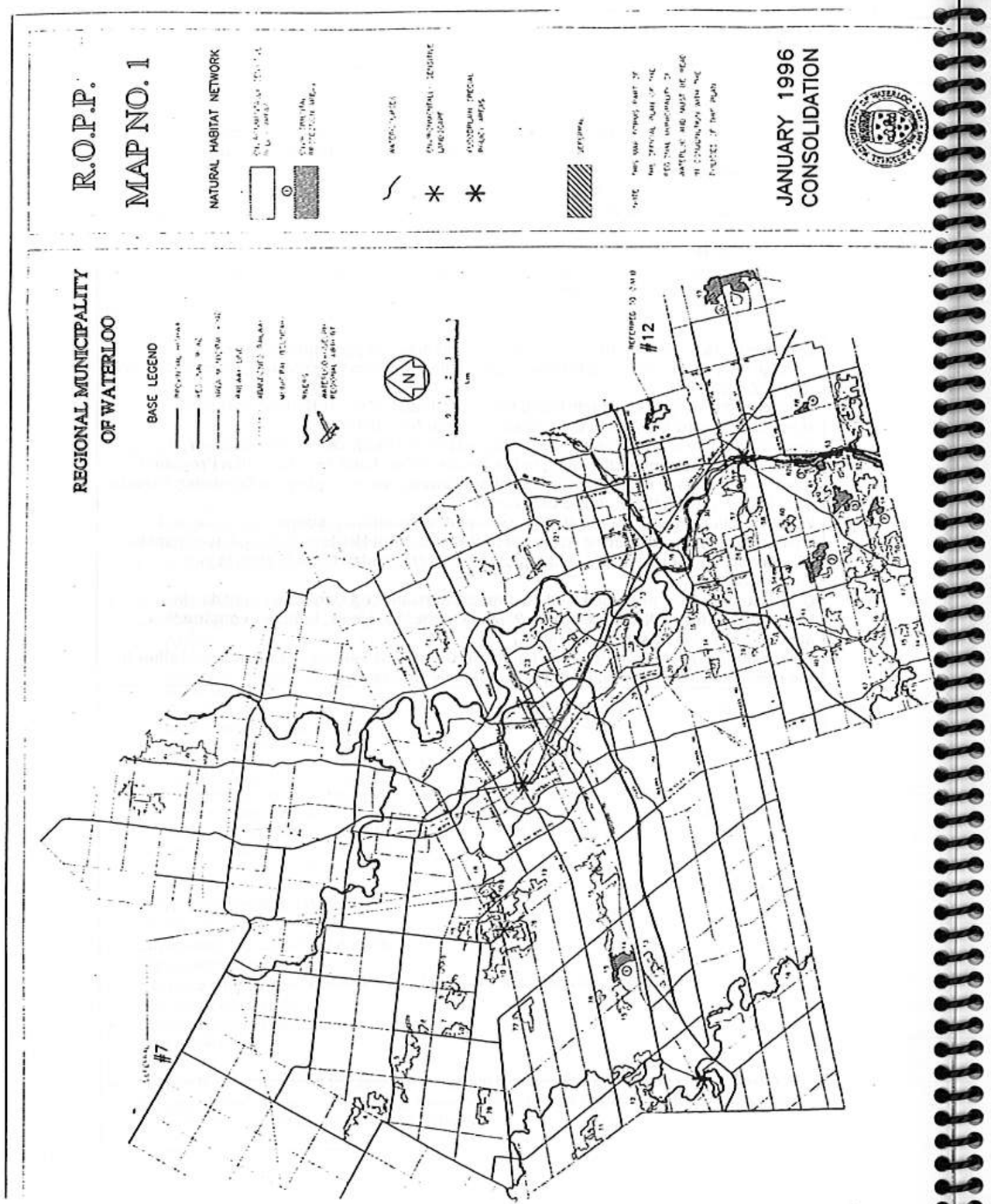
Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?

Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's, Natural Heritage Policy), have impacted either positively or negatively on the protection of Carolinian Canada sites in your jurisdiction?

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)

What natural area designations exist between Carolinian Canada sites that would allow for their connectivity? (including utility corridors and waterways)



Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Brant

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Mailing Address:

Carolinian Canada Sites	Lead Agencies
Six Nations Reserve Forests	Six Nations Planning Department

Official Plan Status: There is currently no County Official Plan.

Site Designations: Not applicable.

Natural Heritage Study ESA Survey of the Six Nations Reserve Forests.

Related Works: Brant County has just approved a new Tree Cutting By-law (5-97), March, 1997 which makes reference to the Official Plans of the Constituent Municipalities.

RESPONSE TO QUESTIONS OF INTEREST

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?

- The new County Tree Cutting By-law prohibits cutting in areas defined as "sensitive natural areas" as legislated in the Official Plan of the County Constituent Municipalities, or the conservation authorities, unless a minor exception is approved by County Council.
- "Sensitive natural areas" are defined as:
  - Provincially significant ANSI's
  - Locally, Regionally, or Provincially Significant Wetlands
  - ESA's as designated by the GRCA and the LPRCA
  - Habitats of Vulnerable, Threatened and Endangered Species
  - Significant Woodlands, Ravines, Valleys, Rivers, and Stream Corridors.
  - Shorelines
  - Significant Wildlife Habitat
  - Significant Natural Corridors
  - Sensitive Natural Areas designated in an approved Official Plan.

What methods have been used to identify natural areas in your jurisdiction?
An ESA survey has been conducted for the Six Nations Reserve Forests.

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?
Unknown.

Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?
Unknown.

Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?
No.

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?
Unknown.

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)
Unknown.

What natural area designations exist between Carolinian Canada sites that would allaw for their connectivity? (incl. utility corridors and waterways)
See GRCA Corridors Concept.

Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Hamilton-Wentworth

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Carolinian Canada Sites	Lead Agencies
Dundas Valle	HRCA, Town of Ancaster
Beverly Swamp	GRCA, HRCA, HRCA

Official Plan Status: "Towards a Sustainable Region" Part C - Land Use Strategy, approved January 1995.
Ammendments: No. 5, September 1997

Site Designations:
- Dundas Valley: ESA, partial ANSI - ROP; Core Natural Area - RGS.
- Beverly Swamp: ESA, ANSI, Class 1 wetland - ROP; Core Natural Area - RGS.

Natural Heritage Study Hamilton-Wentworth Natural Areas Inventory (NAI) conducted by the Hamilton Naturalists' Club (HNC) in January 1991.

Greenway Strategy: Regional Greenlands Syste

Mapping:
Environmentally Significant Areas, Map No. 4 (ROP)
Provincially Significant Wetland Areas, Map No. 1 (ROP)
Niagara Escarpment Plan Areas, Maps No. 3, 3a, 3b (ROP)
Parkway Belt West Plan, Map No. 2 (ROP)
Natural Areas Inventory Study Areas Map, 1997.
Regional Greenlands Preliminary Concept Map, 1994.
Regional Greenlands System Map, 1996.
Forest Cover Analysis by Gartner Lee Consultants (in-progress).

Related Works: (Watershed Plans, Management Plans etc.)
- **Environmental Impact Statement Guidelines**, approved August, 1994.
- **Environmentally Significant Areas Impact Evaluation Group** (ESAIEG), approved October, 1993.
- **Hamilton-Wentworth Natural Heritage Database**, developed by the Region, the HRCA, and the HNC, and is maintained by the Natural Areas Coordinating Group (NACG), 1997.
- **Towards a Regional Greenlands System** - Discussion Paper (1994).

RESPONSE TO QUESTIONS OF INTEREST

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?
- *Vision 2020 Framework*
- *Regional Official Plan Designations*
  ESA's
  Tree-cutting by-law
  Tree protection and enhancement strateg
  Hazard Lands
  Niagara Escarpment
  Parkway Belt West Plan

Greenlands Syste
- *Greenlands System*
  Core Natural Areas
  Linkages
  Restoration Opportunities and other Linkages
- *Ammendment No. 5*
- *Related Works* above.

What methods have been used to identify natural areas in your jurisdiction?
- Hamilton-Wentworth Natural Areas Inventory (NAI) conducted by the Hamilton Naturalists' Club (HNC) in January 1991.
- Natural Areas Coordinating Group (NACG) maintains the Hamilton-Wentworth Natural Heritage Database and consists of members from: GRCA, HRCA, HRCA, NPCA, Royal Botanical Gardens, HNC, OMNR, Regional Municipality of Hamilton-Wentworth, McMaster University, and the Niagara Escarpment Commission.

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?
Ammendment No. 5 to Regional Official Plan involves policy changes related to the introduction of the Greenlands System in the Natural Setting section of the Plan, Servicing Extentions, NEF for the Airport and communal services and potable water supply (September, 1997).

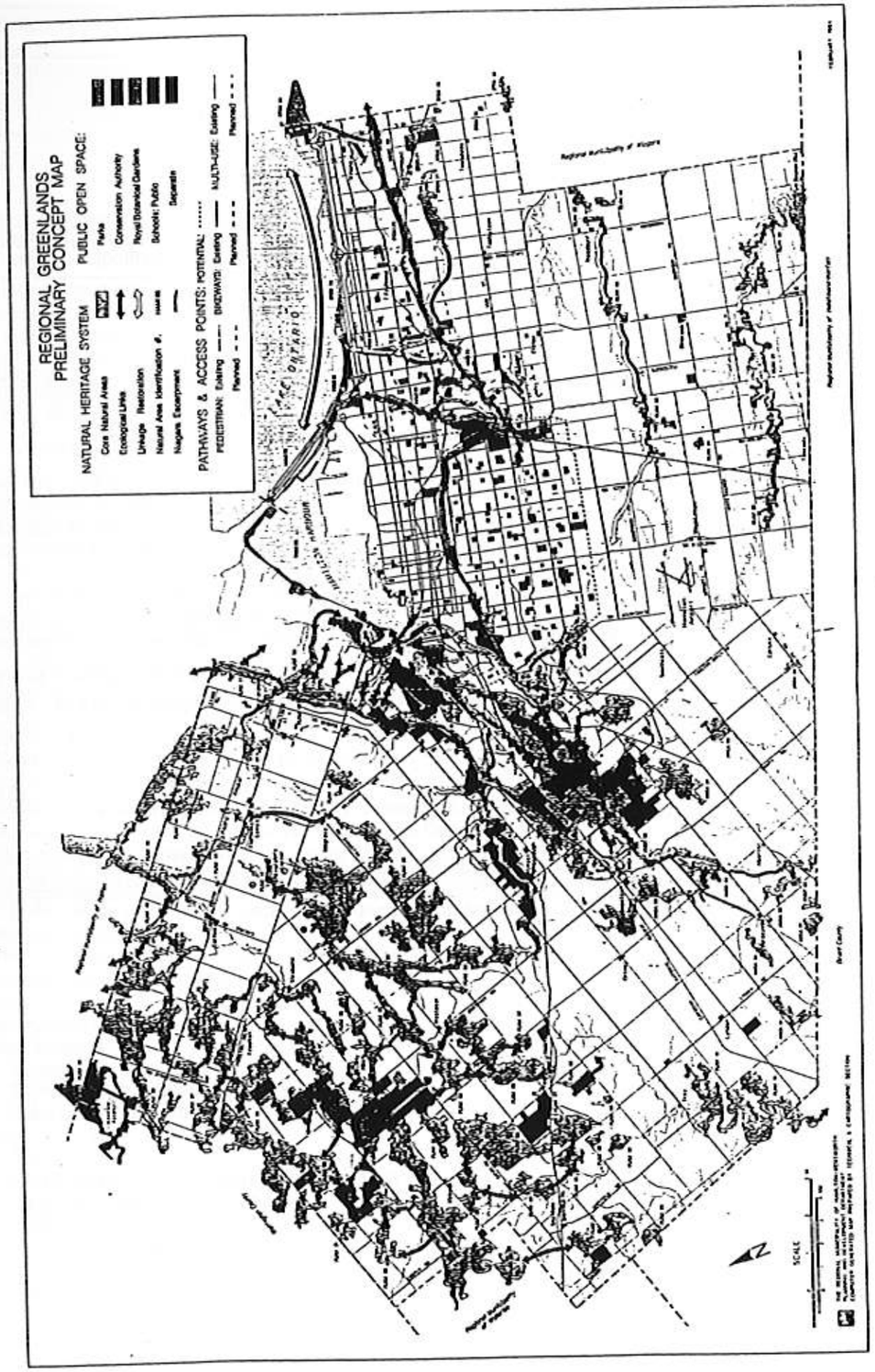
Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?
No land acquisition that the Region is aware of. For further info contact: GRCA and Ben Vanderburg - Land Acquisition Program, and Bruce Duncan - Restoration and Habitat Management Program for the HRCA.

Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?
No changes in public ownership. There may be changes in private ownership/management through work done by the Hamilton Harbour Land Stewardship Program contact: Joanne Rzadki at the HRCA.

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?
So far changes have not affected site status and protection, although there is some uncertaint over what will happen since regional amalgamation: City of Hamilton, City of Stoney Creek, Town of Dundas, Town of Ancaster, Flamborough, and Glenbrook.

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)
Not sure. There is a small development project being launched in Dundas Valley. An expansion of the retreat centre leased from the CA is being planned. Contact Bruce Duncan at the HRCA for further info.

What natural area designations exist between Carolinian Canada sites that would allaw for their connectivity? (incl. utility corridors and waterways)
The Regional Greenlands Strategy uses mostly riparian corridors, privately owned land, or lands owned by the RBG as the main linkages between protected areas in the region.



Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Halton

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Carolinian Canada Sites	Lead Agencies
Sassafras Woods	
Iroquois Shoreline Woods	

Official Plan Status: Regional Official Plan Greenlands System, Part III Land Stewardship Policies Section D, 1995.

Site Designations:

- **Sassafras Woods:** ESA designation in Greelands B System; ANSI; Designated as public open space in Parkway Belt West Plan.
- **Iroquois Shoreline Woods:** ESA designation in Greenlands B System; Designated as public open space in Parkway Belt West Plan.

Natural Heritage Study Halton Region **Environmentally Sensitive Areas Stud** , 1993.

Greenway Strategy: The Greenlands System - Section D, Regional Official Plan, 1995.

Mapping: The Greenlands System Map, Regional Official Plan, 1995.

Related Works:

- **Parkway Belt West Plan**, 1970's by Province.
- **Niagara Escarpment Plan.**
- **Ecological and Environmental Advisory Committee**, 1995.
- **Environmental Impact Assessment Guidelines**, December 1979.
- **Lake Ontario Greenway Strateg** , by the Waterfront Regeneration Trust, 1995.

RESPONSE TO QUESTIONS OF INTERES

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?

- **The Greenlands System** - Section D, Regional Official Plan, 1995.

Greenlands System Designations

ESAs
Escarpment Natural Area
Greenlands A
Regulatory Floodplains
Provincially Significant Wetlands
Lake Ontario and Burlington Bay shoreline
Greenlands B
ESAs
Public Open Space - Parkway Belt West Plan
Regionally Significant Wetlands
ANSIs
Carolinian Canada Sites
Halton Agreement Forests
Regional Waterfront Parks

- Local Official Plans.

- Parkway Belt West Plan.
  Escarpment Lin
  Southern Lin
  Burlington-Oakville Mini-belt Lin
  Oakville-Mississauga Mini-belt Lin

What methods have been used to identify natural areas in your jurisdiction?

- Niagara Escarpment Plan.
- The Greelands System.
- Environmentally Sensitve Area Study.
- Environmental Impact Assessment Guidelines.

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?

- It is the policy of the Region to require Local Official Plans to recognize the Regional Greenlands System and include policies in accordance with its goal and objectives.
- There are changes being made to the ESA boundary of Sassafras Woods in the Regional Official Plan to reflect the ANSI boundary as determined by OMNR.

Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?
Cumis Insurance, the major landowner of Sassafras Woods, has had some success in getting a tax rebate from the province. Contact: Dan Calmusky (905) 827-8894.

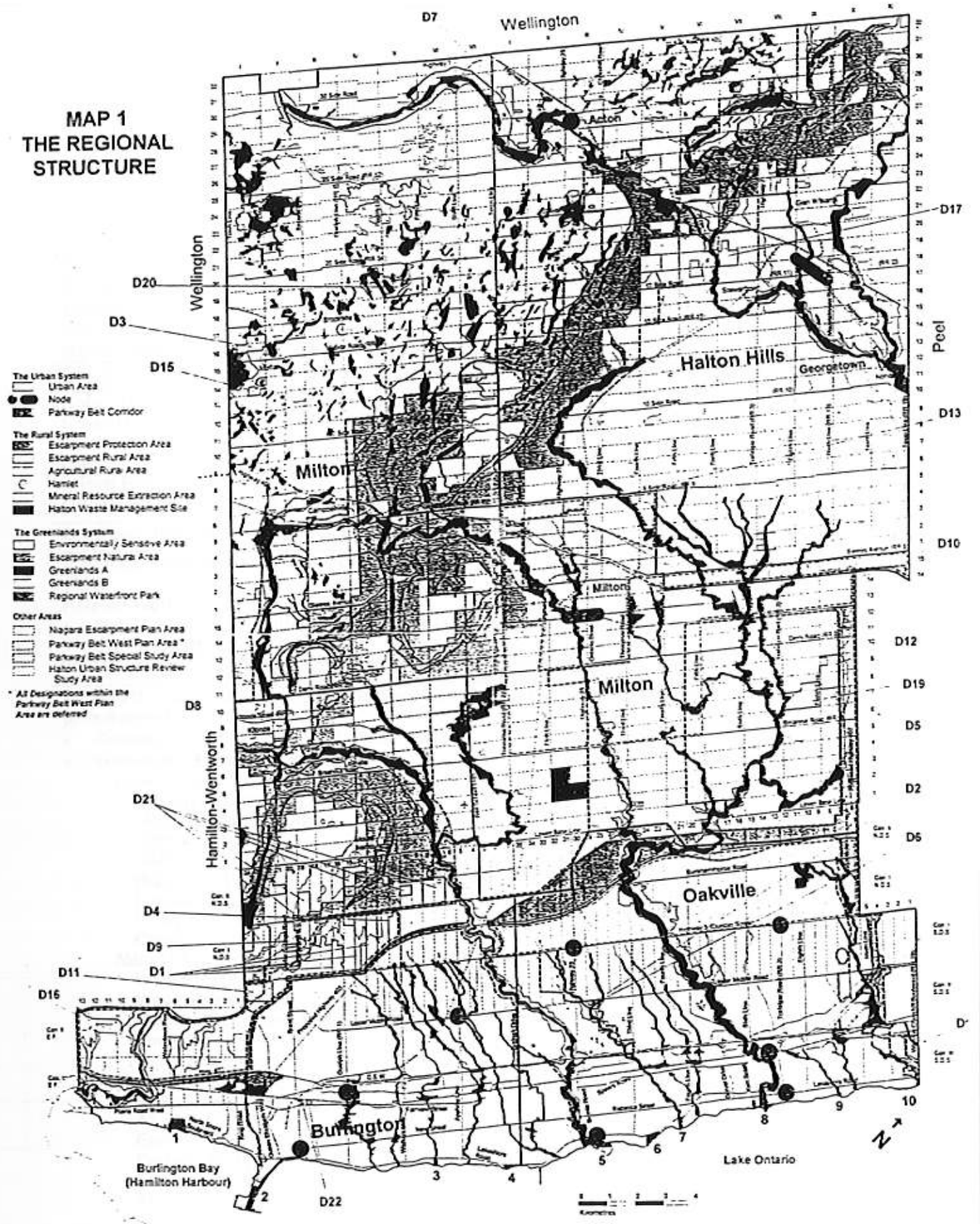
Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?
No.

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?
None.

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)
No.

What natural area designations exist between Carolinian Canada sites that would allaw for their connectivity? (incl. utility corridors and waterways)

- In general, no.
- Sassafras Woods is connected to other ESAs to the north in Halton and Hamilton-Wentworth.
- Iroquois Shoreline Woods is part of Parkway Belt West Corridor.
- Other Greenlands A and B Designations.
- Bronte Creek Provincial Park.



Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: Peel

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Carolinian Canada Sites	Lead Agencies
Note: There are no critical Carolinian Canada Sites in Peel Region. To facilitate landscape connectivity planning in Carolinian Canada, however, knowledge of the planning framewor in Peel Region is necessary.	

Official Plan Status: Region of Peel Official Plan, verbally approved January, 1998.

Greenway Strategy: Greenlands System, Regional Official Plan - Section 2.3

Mapping: Core Areas of The Greenlands System Map - Schedule AA, Regional Official Plan, 1998.

Related Works:

- **Determination of Significant Woodlands in the Regional Municipality of Peel.** OMNR, Maple District Report.

RESPONSE TO QUESTIONS OF INTERES

What is the range of planning mechanisms used for protection of natural areas in your jurisdiction?

- **Greenlands System**, Regional Official Plan - Section 2.3
- *Greenlands System Designations*
  - *Core Areas*
    - Wetlands (Class 1-3)
    - Woodlands (Min. 30ha)
    - ESAs
    - ANSIs
    - Habitats of Vulnerable, Threatened and Endangered Species
    - Niagara Escarpment Plan "Escarpment Natural Areas"
    - Valley and Stream Corridors (Credit River, Humber River, Etobicoke Creek, Mimico Creek)
  - *Natural Areas and Corridors*
    - Wetlands (Class 4-7)
    - Woodlands (3-30ha)
    - Niagara Escarpment Plan "Escarpment Protection Areas"
    - Shorelines
    - Valley and Stream Corridors
  - *Potential Natural Areas and Corridors*
    - Unevaluated Wetlands
    - All other Woodlands
    - Earth Science ANSIs
    - Parkway Belt West Plan Area
    - ESAs
    - Etc.

What methods have been used to identify natural areas in your jurisdiction?

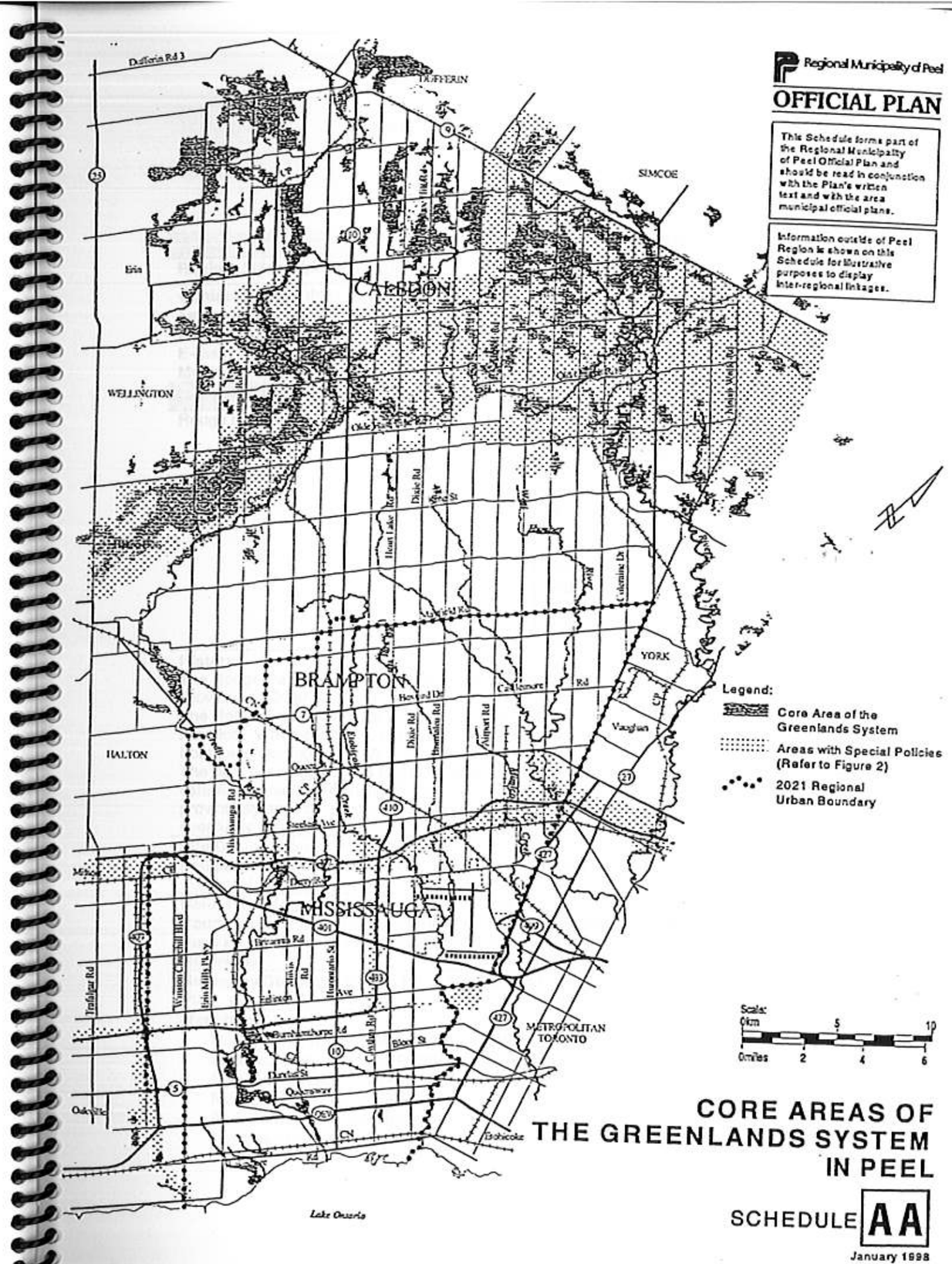
- The Greenlands System, 1998.
- Reference should be made to the area municipal official plans and related documents for a detailed interpretation of the location and extent of protected areas designated as part of The Greenlands System.

What changes do you anticipate being made to Official Plans or By-laws that have significance for natural areas in your jurisdiction?

Area municipalities, when developing or ammending their official plans, must be consistent with the Regional Official Plan, provincial policies, and the Niagara Escarpment Plan.

What natural area designations exist between Carolinian Canada sites that would allaw for their connectivity? (incl. utility corridors and waterways)

- Natural Areas and Corridors Designations of The Greenlands System.
- Potential Natural Areas and Corridors Designations of The Greelands System.



Heritage Resources Centre/Parks Canada
Landscape Connectivity in Carolinian Canada

Research Team:
Patrick Lawrence, Cynthia Lussier, Lori Ann Riviere

NATURAL HERITAGE FRAMEWORK

Regional Municipality/County: New City of Toronto

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Mailing Address: 361A Old Finch Avenue, Scarborough, ON M1B 5K7

Carolinian Canada Sites	Lead Agencies
Rouge River Valle	The Rouge Park Alliance: The Government of Canada Province of Ontario Metro Toronto and Region Conservation Authorit City of Toronto Town of Marka Town of Pickering Town of Richmond Hill Region of Durha Town of Whitchurch-Stouffville Metro Zoo Save the Rouge Valley System Inc.

History:
The Rouge Park and the Rouge Park Alliance was officially announced on April 5, 1995 by the Province of Ontario.
The Rouge Park is the largest natural and cultural heritage park in an urban area in North America. When complete, parklands will protect over 4,700 ha of publicly owned or leased land from Lake Ontario to the Oak Ridges Moraine.
The park planning process began in March, 1990, when the Province announced the intent to establish a major park in the Rouge River Valley, in the GTA. The process was overseen by the provincially appointed Rouge Valley Park Advisory Committee, whose recommendations eventually resulted in the release of the Rouge Park Management Plan by the Province of Ontario.

Site Designations:
Rouge River Valley: 21 ESA's; 2 Provincially Significant Wetlands; 8 Provincially and Regionall significant ANSI's.

Natural Heritage Study Varga, S., J. Jalava and J.L. Riley. 1991. **Ecological Survey of the Rouge Valley Park.** Parks and Recreational Areas Section, Ontario Ministry of Natural Resources, Open File Ecological Report 9104, Central Region, Aurora, Ontario. Queen's Printer for Ontario.

Greenway Strategy: Ontario Ministry of Natural Resources. 1994. **Rouge Park Management Plan.** Queen's Printer for Ontario.

Mapping:
- Rouge River Watershed, Figure 1, RPMP.
- Park Boundary, Figure 2, RPMP.
- Detailed Park Boundary (South and North), Figures 3, 4, RPMP.
- Park Concept, Figure 5, RPMP.
- Park Zoning, Figure 6, RPMP.
- Proposed Rouge Park North of Steeles Avenue, Figure 7, RPMP.

Related Works:
An Introduction to the Rouge Park, by Ron Reid, March 1997.
Progress Report - A Partnership in Natural and Cultural Heritage Protection, January, 1997.
Rouge Park Connections Vol.1, No.1, March 1997.
Works In-Progress:
Rouge Park Interpretation Plan (Subcommittee)
Natural and Cultural Heritage Program (Subcommittee)
Rouge Park Trails Development and Management Plan (Subcommittee)
Rouge Park Vegetation Management Plan (Subcommittee)
Rouge Park North Management Plan (Subcommittee)

RESPONSE TO QUESTIONS OF INTEREST

What is the range of planning mechanisms used for protection of Carolinian Canada sites in your jurisdiction?

- Rouge Park Management Plan, Park Zoning.
- Rouge Park Alliance and Subcommittees.
- Local Official Plans.
- Provincial Policy Statement.

What methods have been used to identify natural areas in your jurisdiction?

- Varga, S., J. Jalava and J.L. Riley. 1991. **Ecological Survey of the Rouge Valley Park.** Parks and Recreational Areas Section, Ontario Ministry of Natural Resources, Open File Ecological Report 9104, Central Region, Aurora, Ontario. Queen's Printer for Ontario.
- Numerous other inventories of the area (see bibliography, Rouge Park Management Plan).

What changes do you anticipate being made to Official Plans or By-laws that have significance to the Carolinian Canada sites in your jurisdiction?
I assume that local official plans will have to conform to the Provincial Policy Statement and to the Rouge Park Management Plan, as will the New City of Toronto Official Plan.

Are you aware of any land acquisitions related to the sites? Or, are you aware of an additional landowners participating in the Conservation Land Tax Reduction Program?

- Unknown.
- The development of a comprehensive stewardship program for both private and leased lands within the Rouge Park is a high priority for the Rouge Park Alliance. Stewardship programs may include options such as the provision of technical advice on ecologically-based propert management, an awards program, and assistance with natural landscaping.
- Stewardship agreements make take many forms, from informal handshakes to voluntar registration of conservation easements on land titles. The Rouge Park Alliance will also explore the applicability of existing stewardship programs such as the CLTRP.
- Land considered essential for acquisition (as part of the RPMP) will be acquired on a willing seller-willing buyer basis, conditional upon the availability of funding.

Have there been any changes in lead agencies owning or managing the Carolinian Canada sites in your jurisdiction? Public or private?

- Unknown.
- The Rouge Park South area (south from Steeles Ave. to Lake Ontario) is composed of lands and waters predominantly owned by the MTRCA and the Ontario Ministry of Government Services, with smaller holdings by the Ministry of Transportation, Ontario Hydro, other utilities and a number of private owners.

What recent changes, as a result of government restructuring, budget cutbacks, and changes to provincial policies (Wetlands, ANSI's Natural Heritage Policy), have impacted, either positively or negatively, on the protection of Carolinian Canada sites in your jurisdiction?
Unknown.

Do you know of any proposed land use threats surrounding Carolinian Canada sites, or barriers to connectivity between sites? (development projects, highway construction, agricultural expansion, new regulation)
Generally unknown.

Highway 401 runs through the Rouge River Valley.

What natural area designations exist between Carolinian Canada sites that would allow for their connectivity? (incl. utility corridors and waterways)
The Rouge River Valley contains several natural area designations, as mentioned above.

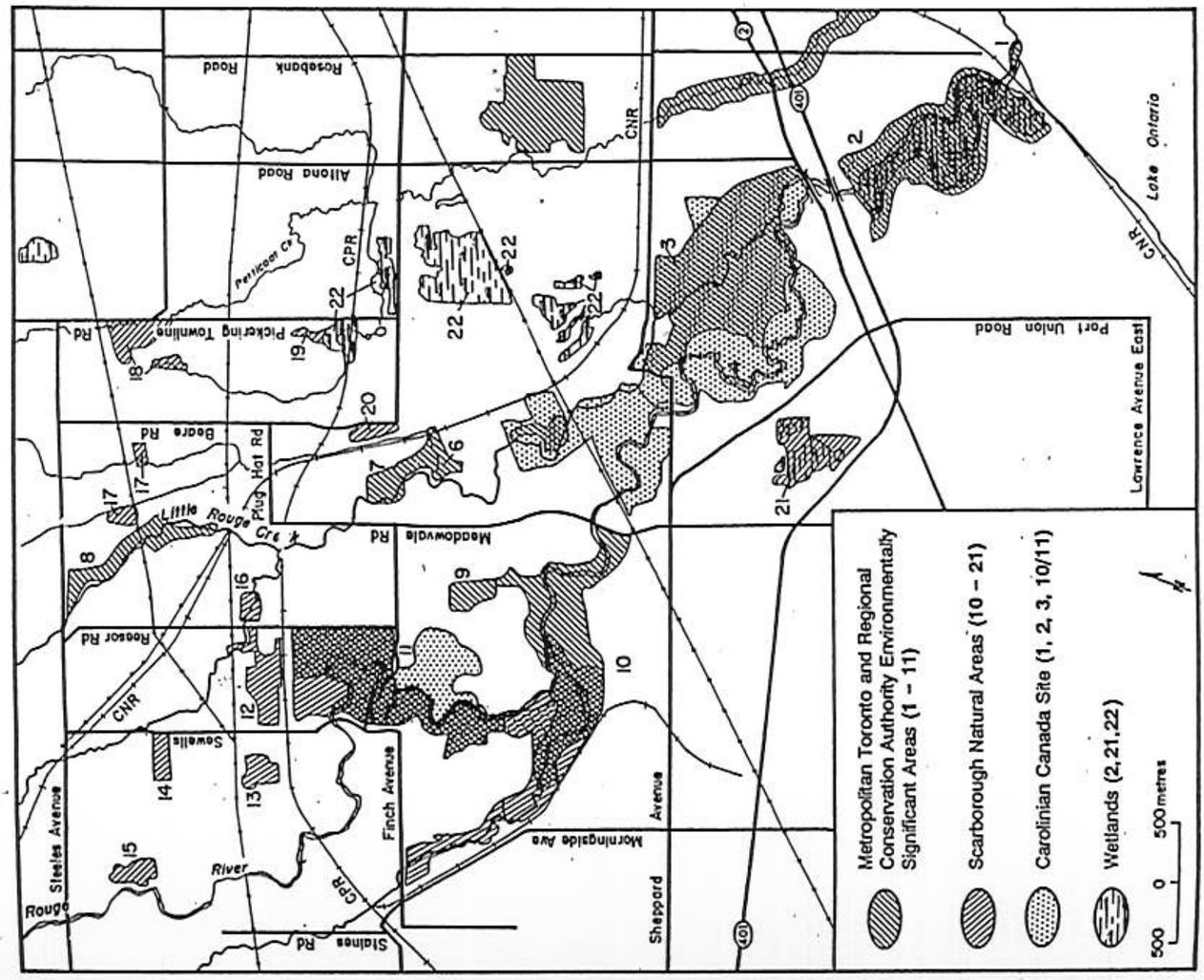
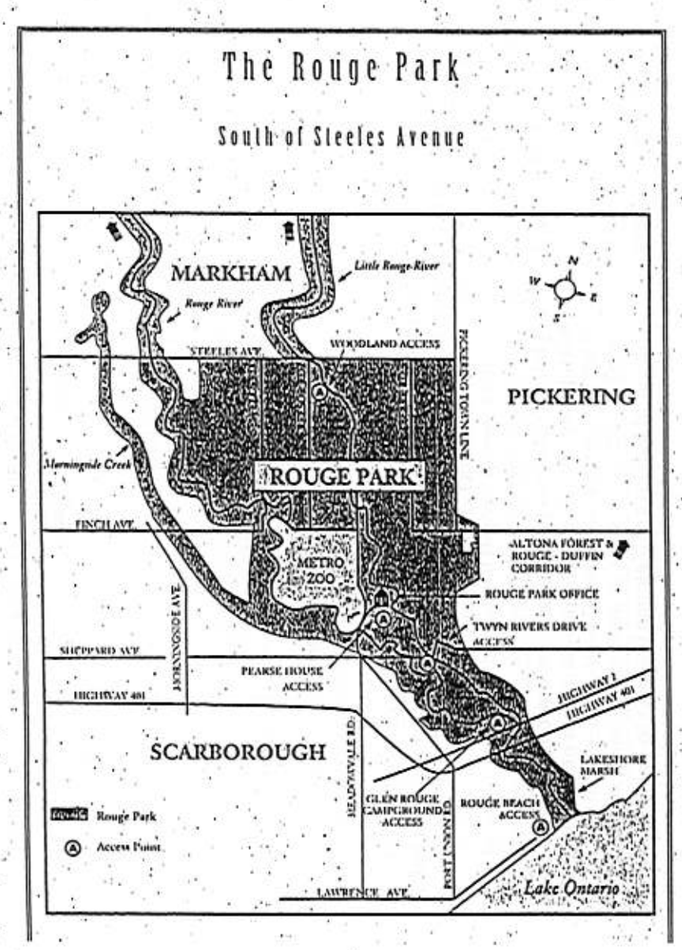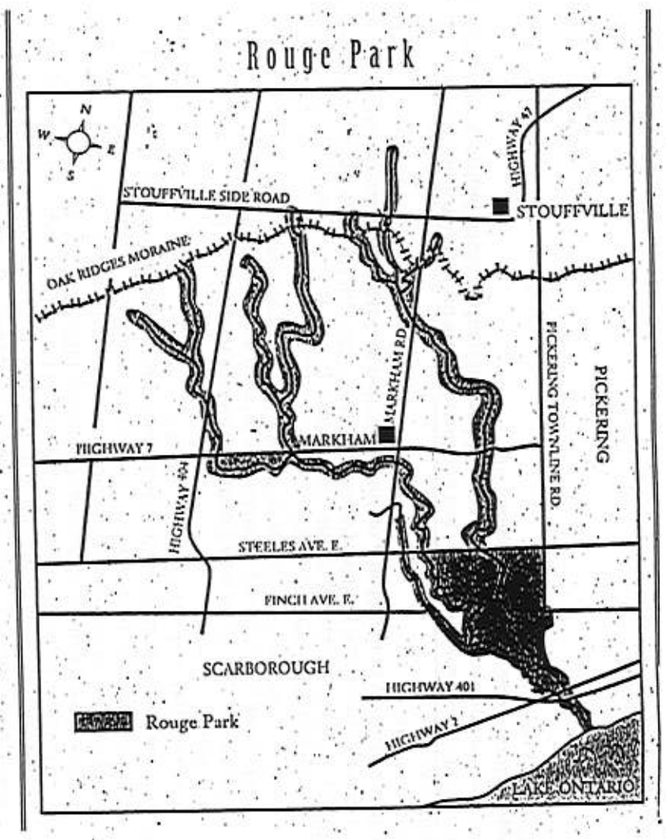
Figure 34. (continued)