

# Halton Region Environmentally Sensitive Areas Consolidation Report

April 2005

This report consolidates the findings from two update studies done in 1995 and 2002. Thus the information contained herein is current only to 2002.

#### Consolidated Reports:

Environmentally Sensitive Area Study 1995, Geomatics International Inc.

Environmentally Sensitive Area Update Study 2002, Mirek Sharp & Associates Inc.

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### 1.0 INTRODUCTION

In 1976, Halton Regional Council approved the formation of an Ecological and Environmental Advisory Committee (EEAC) to advise the Region in matters pertaining to Halton's natural environment. One of the first tasks the committee undertook was the identification of areas deemed significant by virtue of their natural character and perceived long-term value to the Region, to facilitate their protection from adverse impacts. These areas were called Environmentally Sensitive Areas (ESAs).

At that time, a two-year program was undertaken to identify ESAs. It involved a summer biological study (Tant et al. 1977) and a hydrogeological study (Ecologistics Ltd. 1977). EEAC contributed to the program by sorting through the available data, developing selection criteria, investigating candidate sites and selecting final ESAs. The final report (EEAC 1978) identified 38 ESAs of which 37 were embodied into the Official Plan for the Region of Halton (Figure 1).

The ESA Program has served Halton well over the last 26 years and has also provided a model for similar studies elsewhere in Ontario. Of the initial 38 proposed ESAs, only one entire ESA (No.11 Bronte-Burloak Woods) and part of another (No.13 Iroquois Shoreline Woods) have been lost to development. Following the revision of the criteria, only two ESAs (No. 14 Wildflower Woods and No.15 Joshua Creek Valley) have been recommended for deletion as ESAs. Despite the good record of ESA protection, an EEAC subcommittee report in 1991 concluded that there have been peripheral impacts in many ESAs. The ESA policies are coming under ever increasing scrutiny owing to development pressure throughout the Region. The 1978 ESA study, although an excellent document, was not originally intended to serve as the sole support for the protection of ESAs, and be subjected to detailed examination during tribunals such as the Ontario Municipal Board and Divisional Court. In view of this, the need was identified on several occasions for studies that would provide more rigorous data on ESAs and update the rationale for protecting remnant natural areas.

There has been a considerable amount of additional information collected on Halton's ESAs since the 1978 study. In 1991 Geomatics International Inc. completed an update (Phase 1) to examine and refine the criteria on which the ESAs were based and evaluate the efficacy of the Environmental Impact Assessment (EIA) process. In 1993, Geomatics International Inc. completed Phase 2 of the ESA update which included a re-evaluation of existing ESAs using the refined criteria from Phase 1, updating and improving the ESA database, and undertaking field studies to modify ESA boundaries and evaluate new candidate ESAs.

The 1991 study refined the selection criteria based on the perception that some of the criteria were seen as being more important than others. For this reason, two levels of criteria were proposed; primary and secondary. Similar to the 1978 ESA study, any

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Figure 1. Environmentally Sensitive Areas

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area meeting at least one of the primary criteria can be designated an ESA. However, not all areas meeting just one criterion may necessarily be designated an ESA. Some areas may be degraded or disturbed to such an extent, that although they may harbour a rare plant or animal, they no longer have sufficient ecological integrity to warrant ESA status. Thus, assignment of ESA status requires some professional evaluation and judgement, in addition to satisfying the selection criteria. Secondary criteria are not sufficient by themselves to warrant designation of areas. Secondary criteria contribute to the quality of the environment and serve a role in supporting areas designated on the basis of other criteria.

During 1994 and 1995, the Region built upon the 1993 ESA update study through additional land owner contact, and the collection and review of other inventories, assessment studies, consultant reports, Environmental Impact Assessments (EIAs), Areas of Natural and Scientific Interest (ANSI) reports, wetland evaluations and other information sources. This resulted in a revised draft ESA report which was produced by the Region of Halton (Geomatics International 1995).

In October of 2001, as part of the Regional Official Plan review, the Region retained Mirek Sharp & Associates Inc. to carry out another ESA update study (Mirek Sharp & Associates 2002). The consultant worked with Regional staff and the Region's EEAC to determine guidelines for resolving boundary discrepancies among several related programs (e.g., provincial ANSI and wetland programs, and Regional ESAs) evaluate potential new candidate ESAs and update information in a refined ESA database. In making decisions on boundary adjustments, current thinking with respect to linkages and other directions in landscape ecology were considered.

This current report consolidates information from the 1993, 1995 and 2002 update studies. It is important to note that no additional information, changes to wetland or ANSI boundaries or updates to species status' are included here. The information contained within this report on area designations (ANSIs, wetlands, etc.) and rare species are only current to 2002. Detailed methods for conducting the consolidation are provided in the methods (Section 2).

## 2.0 METHODS

This consolidation report is based primarily on two reports: the 1995 update study (Geomatics International Inc. 1995) and the 2002 update study (Mirek Sharp & Associates 2002). Detailed methods from both of these reports are provided in Appendices 1 and 2. The largest portion of the current report is taken from the 1995 report with the 2002 report providing the information on species status, area designations and ESA boundaries current to 2002. The criteria fulfilled for each ESA

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has also been updated to reflect the recommended wording from the 2002 report. The ESAs were not systematically screened for all of the criteria in 2002.

In the case of a discrepancy between the 2002 and 1995 reports, information was added to each ESA based on the 2002 report but was not removed unless the change was specifically noted in the 2002 report. For instance, if the number of birds documented for a site was larger in the 2002 report than the number reported in 1995, then the more recent number of birds was reported here. However, if the number of birds documented in 2002 for a site was smaller than that reported in 1995 no changes were made. This is mainly owing to the fact that the species richness reported in 2002 was based on the database, which was very conservative to avoid inclusion of unverified species. This was unavoidable owing to problems associated with different boundaries of various studies and the lack of information on the exact location of some species (see Methods in Appendix 2). We know that in several cases the number of species included in the database (and thus in the 2002 report) is less than that which actually occurs in the ESA. These have been marked with an asterisk in the individual ESA descriptions (Section 5). This was also the case with area designations. If the 2002 report documented an ANSI as occurring wholly or partially within a particular ESA it was added to the description. However, if the 1995 report documented an ANSI as occurring and the 2002 report did not, the ANSI designation was not removed from the description.

It is important to note that the rarity status' (national, provincial and local) for a number of plant and animal species have changed since 2002. The rare species lists for each ESA are current only to 2002 and should be reviewed based on the most up to date rarity status available. For instance, map turtle and milksnake were not considered provincially rare in 2002 and thus are not included in the ESA descriptions under criterion 6, however they are both considered Species of Special Concern by COSEWIC and the MNR and would fulfil that criterion for the ESAs where they are documented as occurring.

Seven candidate ESAs were recommended for addition in the 2002 study and two ESAs were recommended for deletion based on the information available in 2002. At the time of this consolidation report these changes have not been implemented.

### **3.0 RECOMMENDATIONS**

#### **3.1 Revised ESA Criteria**

As part of the 2002 ESA update study (Mirek Sharp & Associates 2002), the criteria for identifying ESAs, were reviewed to identify the need for minor revisions that would make them more current. The intent was not to suggest any major changes, but to

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have them better reflect current thoughts on conservation biology that are relevant to natural area protection. As a result, the following criteria were proposed. The existing criteria for designating Environmentally Sensitive Areas are found in Part VII Appendix to the Regional Official Plan (1995), and the changes are highlighted in Mirek Sharp & Associates 2002).

### **Primary Criteria**

1. Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.

The loss of species is currently recognized as one of the greatest worldwide conservation problems. Its inclusion in local-level conservation initiatives such as Halton's ESA program is important. The term "species richness" refers to the number of species present and is preferred over "species diversity", which considers the relative number of individuals of each species in addition to the number of species. The criterion is intended to be applied with respect to Halton. Thus, areas should be assessed relative to other areas within Halton, not outside the Region. At present, with the current level of survey data available, it is recommended that any natural area with greater than 300 native vascular plant species should qualify for this criterion. Similar standards for fauna are not recommended at this time owing to a lack of data on which to base a decision.

2. Areas that provide functional links among two or more adjacent natural systems.

This criterion should be used to protect natural systems that: (a) serve as significant wildlife corridors on their own; and (b) serve to link two or more designated natural areas together by acting as a migratory corridor or dispersal route for wildlife and plants; and (c) serve to link areas that are essential for organisms to complete their life cycle (e.g., several species of tree frog which require wetlands for breeding and woodlands to overwinter). It is not, however, intended to enable designation of every hedgerow that extends between two natural areas. The natural areas being linked together must already be protected through programs such as the ESA program, flood and fill regulations, provincial parks systems, Areas of Natural and Scientific Interest (ANSI) program or other natural area programs.

3. Areas that contain a relatively high number of native plant communities in the context of Halton Region.

The main intent of this criterion is to protect areas that contain a range of native communities or habitats that occur within one area. This would not only provide representation of a wide range of natural communities within one area, but would also provide additional benefits such as preserving the natural biological, hydrogeological



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and hydrological interactions that occur among communities. As with criterion 1, this criterion should be interpreted in a regional context.

4. Areas that contain large (in a regional context), relatively undisturbed expanses of natural, native plant communities, in particular those that support interior forest conditions.

The pattern of development throughout southern Ontario has left a disturbed, dissected landscape. Continuous expanses of native vegetation are uncommon and those that remain should be protected. "Undisturbed" is qualified since there are no completely undisturbed areas remaining in the Region. Undisturbed in this context basically means undeveloped, i.e. excludes aggregate extraction, agriculture, urban, suburban, hamlet and rural housing developments. Continuous should be interpreted in a biological sense, thus a road, or utility right-of-way should not necessarily constitute a break in the continuity of an area. Size is not specifically defined here since it needs to be determined in a regional context. The criterion should thus protect the largest remaining areas in the Region.

5. Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.

The intent of this criterion is to protect at least one example of each of the native vegetation types that occur in Halton. Rare communities are specifically noted since their designation and protection should be a high priority. Priority should be given to designating the best examples, with respect to extent (size) and quality. In addition, by capturing representative native vegetation in the ESA program, examples of pre-European settlement landscapes are also protected.

6. Areas that contain plant and/or animal species that are rare or in peril provincially or nationally.

This should include species of flora, fauna and vegetation communities ranked as S1, S2 or S3 by the Natural Heritage Information Centre, species designated as endangered, threatened or vulnerable by the MNR, and species with a COSEWIC status.

7. Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.

This criterion is intended to protect examples of at least one of each of the earth science features **and processes** that occur in Halton, particularly as they define and express characteristic landscapes within the Region. Priority should be given to designating the best examples, with respect to extent (size) and quality.

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8. Areas that are determined to contribute significantly to local and/or regional groundwater recharge.

The intent of this criterion is to help maintain the quantity of groundwater resources in the Region. Owing to the lack of a region-wide groundwater data base with which to evaluate the significance of the recharge in a particular area, there will have to be some reliance on expert judgement to apply this criterion. Each time the criterion is applied the rationale and source of expertise should be documented.

9. Areas that are determined to be significant groundwater discharge areas.

The intent of this criterion is to protect areas that contribute significantly to maintaining surface water quality. As with the previous criterion, expert judgement should be used and referenced when applying this criterion.

10. Areas that contribute significantly to groundwater quality.

The intent of this criterion is to protect areas, which contain filter beds, wetlands, or large recharge areas which are free of contamination, and contribute to high quality groundwater.

11. Areas that contribute to maintaining surface water quality and quantity.

This should be used to designate areas that contribute to surface water quality by holding water and slowly releasing it, (e.g., wetlands), shading the water surface to prevent elevation of water temperature, filtering surface water, and contributing runoff low in pollutants.

#### **Secondary Criteria**

12. Areas that contain regionally rare plants.

Regionally rare plants are perceived to be valuable as they contribute to the landscape that is unique in Halton. However, since many of these species may occur more commonly in areas adjacent to the Region, they are not considered sufficiently significant to warrant designating an area as an ESA without the support of other criteria.

13. Areas that contain high quality assemblages of native plant and/or animal species.

This criterion is best used as support for other criteria. It can be assessed by evaluating the health, maturity and population size of vegetation in an area, determining the ratio of

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native to non-native species of plants or animals, or by documenting the lack of human disturbance in a regional context.

14. Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.

Aesthetic criteria can be highly subjective. It is therefore recommended that they not be used as the sole reason for designating an area. Use should be made of existing documentation to determine areas that are documented as being scenic areas or provide scenic views. This can include designated lookouts on the Bruce Trail or in park and conservation area master plans, references in the Niagara Escarpment Plan and its supporting documentation, etc.

15. The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.

Studies in natural areas provide valuable documentation of baseline conditions. These are useful for monitoring the condition of the environment, identifying changes in natural areas and understanding the relationship between human activities and the environment. In addition, the education of the public is important for raising environmental consciousness and subsequently gaining support for the preservation of natural areas.

### 3.2 Recommendations For Changes to ESA Status

This report consolidates two earlier reports which provide recommendations based on the re-evaluation of existing ESAs and potential new ESAs. The recommendations for adding and deleting ESAs are contained within the individual ESA descriptions in Section 5.0. These recommendations, from Mirek Sharp & Associates (2002), are summarized below.

#### **Recommended as New ESAs:**

Burlington Beach  
Black Creek at Acton  
Woods adjacent to Halton Sludge Plant  
Galt and Moffat Moraines  
Paris Moraine  
Trafalgar Moraine  
New Acton Swamp

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### **Not recommended as ESAs:**

Woods opposite Mohawk Inn  
La Salle Park, Burlington

### **Recommended for Deletion:**

Wildflower Woods  
Joshua Creek Valley

### **Recommended for further study:**

Former National Sewer Pipe Lands

## **4.0 BIOPHYSICAL ENVIRONMENT OF HALTON REGION**

This description of the biophysical environment of the Region is taken directly from the 1995 report (Geomatics 1995), with the exception of the last section detailing significant flora and fauna. This discussion was provided in the 2002 update study (Mirek Sharp & Associates 2002).

### **4.1 Physical Environment**

The physical environment is expressed in the bedrock, landforms, soils and waters of the Region. Together with climate, these provide the conditions for the growth of plants, persistence of fauna, and associated ecological processes.

Halton's physiographic character is dominated by the Niagara Escarpment. The escarpment bisects the Region on a north-south axis. It is an erosional landform, also referred to as a cuesta, which was created by glaciers and water. Physical and chemical forces associated with these elements have differentially eroded the rock strata comprising the escarpment.

Relatively hard dolomites cap the escarpment and underlie the western portion of the Region. Softer shales and siltstones form the lower face of the escarpment and underlie the eastern and southern portions of the Region. As a result, the topographic expression, surficial materials, soil types, surface drainage and groundwater flow regimes are significantly different above and below the escarpment.

#### **Bedrock Geology**

Within the Region of Halton, there is a major transition in many of the rock formations, which make up the Niagara Escarpment. This generally reflects a northward deepening in the salt water seas into which the original sediments were deposited during the Palaeozoic Era (approximately 400 to 500 million years ago). The Niagara Escarpment

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itself has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program. This designation indicates that the Niagara Escarpment, as a whole, is an internationally significant landform. Where this designation is listed in this study relating to individual ESAs, it is important to note that from an earth science perspective, any particular portion of the Niagara Escarpment is not necessarily more significant than any other portion, it is simply included to point out that the feature is part of a greater significant feature of the landscape.

The Lockport-Amabel Formation forms the upper scarp face and underlies all of the Region located above the escarpment. From the Niagara Peninsula to approximately Waterdown (near the boundary between Halton and Hamilton-Wentworth) this is known as the Lockport Formation. To the east and north, it becomes more massively bedded, and is referred to as the Amabel Formation. Although often referred to as limestone, this formation is actually a dolomite. Both limestone and dolomite are types of carbonate rocks. Dolomites have magnesium and calcium as major constituents whereas limestones are predominately calcium carbonate.

Below the Lockport-Amabel is a sequence of rocks known as the Clinton and Cataract Groups. These are exposed in the face of the escarpment, particularly in river valleys which have eroded into the scarp face. Again, many of these formations show transitions in their bedding and composition from south to north, particularly in the vicinity of Milton.

The oldest rocks exposed in Halton are the Ordovician Queenston and Georgian Bay Formations. Both are dominated by shales, but also have thin beds of limestone and siltstone. The Queenston is characterized by red shales and forms the lowermost slopes of the escarpment and also underlies most of the rolling plains below the scarp. The Georgian Bay Formation is blue-grey in colour and tends to outcrop only along stream and creek valleys in the southeastern portion of the Region.

#### **Surficial Geology**

The surficial geology of Halton is mostly represented by glacier and glacial lake sediments although more recent alluvial (stream) and organic deposits are also common.

Below the escarpment, the rolling plains overlying the Queenston Formation consist primarily of thick silty to sandy clay till referred to as the Halton Till. This till is reddish in colour as it is composed primarily of glacially reworked Queenston shales. Inland of the Lake Ontario shore are former shorelines created by Lake Iroquois, a post glacial lake which occupied the Lake Ontario basin and was up to 30 m higher than the present lake level.

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Above the escarpment is a discontinuous to thick sandy till known as the Wentworth Till. Near the escarpment it tends to be thin, resulting in a flat, bouldery plain with numerous bedrock exposures. The till reaches much greater depths where it forms portions of major end moraine systems including the Paris, Galt, Moffat and Waterdown Moraines. These generally trend northeast to southwest marking the location of major ice-front positions during the late Wisconsin glaciation. The Wentworth Till also forms the material within the small drumlin field located in the vicinity of Brookville in northwest Halton. Drumlins are generally formed during advancing stages of the glacier and, therefore, these drumlins were likely formed during the advance to the Galt Moraine position.

Materials deposited from flowing meltwater, either within the ice mass or in front of the ice, are referred to as glaciofluvial deposits. These are constructed during retreat phases of the ice when abundant meltwater is present. Characteristic glaciofluvial features include outwash plains, meltwater channels, kames, kettles, and eskers. All are represented in Halton, particularly above the escarpment and within the large re-entrant valleys which cut across the scarp.

#### **Soils**

The soils of Halton are variable but most of the Region is represented by the Wentworth and Halton Tills. Soils developed in the former tend to be stony, variable in depth and generally have low agricultural capabilities. Soil types are commonly luvisols, and in wetter areas, gleysols.

Soils, which form on the Halton Till, are heavier clay loams, which are highly suitable for intensive agriculture. These soils are mostly luvisols.

#### **Hydrology**

The hydrology and hydrogeology of the Region are closely linked to the landform characteristics. Many streams originate on or immediately below the escarpment and flow southerly or southeasterly toward Lake Ontario. These include, from west to east, Grindstone, Bronte (also known as Twelve Mile Creek) and Oakville (Sixteen Mile Creek) Creeks and the Credit River. In the northernmost portion of the Region, surface drainage is westerly via Blue Springs Creek. This creek is a tributary to the Eramosa River which flows into the Grand River, a major watershed of Lake Erie.

The thin soils above the escarpment and the fractured nature of the Lockport-Amabel Formation (which also serves as a karst aquifer due to the soluble nature of the rock) results from high infiltration of rainfall in this area. Portions of many small creeks are also captured by bedrock joints, thus recharging groundwater flow. This is particularly common in the Hilton Falls and Speyside ESAs. As a result, numerous springs occur at the face of the escarpment, contributing cold water to the surface drainage network.

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Groundwater flow lines indicate major discharge zones along the Oakville, Bronte, Grindstone and Blue Springs Creeks where depth to bedrock is shallow. Possible zones of bedrock recharge are located west of Mount Nemo and in the Milton Heights areas (Ecologistics 1977).

A similar recharge/discharge pattern is found in the overburden aquifers of the Region. Zones of significant recharge are likely located northwest of the escarpment brow near Kilbride and possibly to the north near Campbellville. It appears that a significant amount of groundwater recharge occurs to the west of the boundary between Halton and Hamilton-Wentworth. Significant recharge on a regional scale may also be occurring in portions of Halton Hills (vicinity of Acton). In general, discharge flows south and east from the escarpment, much as surface water in small tributaries, toward the Oakville, Bronte, and Grindstone Creeks.

Significant groundwater flow is also likely occurring below the escarpment through the buried bedrock valley in the vicinity of Palermo, flowing into Bronte Creek near the Q.E.W. Highway. Major groundwater discharge is also occurring towards the Credit River in the Georgetown area (Ecologistics 1977).

## 4.2 Biotic Environment

### 4.2.1 Forest Cover

The great variety of soil types and physiographic features in Halton, plus a climate favourable for plant growth, combine to provide a rich and diverse biotic environment. Halton falls within the Niagara Section of the Deciduous Forest Region, and the Huron-Ontario Section of the Great Lakes-St. Lawrence Forest Region (Rowe 1972). The dividing line between these sections approximates the route of Highway 401, however, the exact position of the line is arbitrary and the differences which distinguish these two forest sections change gradually from the south of the Region to the north.

This north - south gradient is made more prominent by the presence of the Niagara Escarpment. Below the escarpment, in the extreme southwest of the Region, a warm microclimate prevails which facilitates the persistence of species near the north of their natural range. The relatively open-canopied forests, dominated by oaks that occur here are absent north of Highway 401. Conifer species are poorly represented in southern Halton. White pine, and on east and north-facing slopes, eastern hemlock, are the only conifer species which occur frequently within Halton. Above the escarpment, especially in the north half of the Region, the forest cover is more northern in nature, with sugar maple being the dominant hardwood tree and eastern white cedar and balsam fir becoming much more frequent.

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### **Niagara Forest Section**

The Niagara Forest Section falls within the Deciduous Forest Region (Rowe 1972). This area is also commonly referred to as the Carolinian Zone, in reference to the many species, which have affinity with areas further to the south. The Niagara Section comprises the counties bordering Lakes Erie and Ontario, and the Niagara Peninsula. It is the only Canadian portion of the deciduous forests which once covered much of the mid-eastern United States. Since it is characterized by flat to undulating terrain, deep fertile soils, and a climate made favourable by the ameliorating effect of the Great Lakes, most of this forest region in Canada has been urbanized or cleared for agriculture. Remnant natural forests in stream valleys and occasional woodlands are all that remain. This description characterizes southern Halton, where the southern Deciduous Forest is now represented only in the major stream valleys such as lower Sixteen Mile Creek, and in scattered woodlands such as Sassafras Woods and Iroquois Shoreline Woods.

### **Huron-Ontario Forest Section**

This Forest Section occurs in the Great Lakes-St. Lawrence Forest Region (Rowe 1972). This Forest Region is well represented in Canada covering most of southern Ontario and Québec. The Huron-Ontario Section is prevalent above the Escarpment and extends north all the way to the Precambrian shield. Since soils above the escarpment, especially near the brow, are shallow or gravelly, or otherwise poorly suited to agriculture, clearing for agriculture was less prevalent, and considerable areas of forest still exist, such as the 2689 ha Hilton Falls Complex.

Although these forests have been logged and/or burned in the past, the second growth is representative of the Great Lakes- St. Lawrence Region. Sugar maple and beech are predominant, with black cherry, basswood, red oak, white ash, white pine and eastern hemlock as common associates on upland sites. Wetland communities are well represented in the northwestern part of Halton.

### **4.2.2 Flora**

According to the 1993 report (Geomatics 1993) there are 1199 vascular plant species reported from the Region, as documented by voucher collections (based on Crins 1986). Of these, 358 (29.9%) are not native to Canada, but were introduced either accidentally or through the horticultural trade. An additional 71 species, which to our knowledge are not verified by collections, were recorded in various studies reviewed for the 1993 update. Sixteen of these additions were not native. This brings the Regional vascular flora to 1,270 species, with 374 (29.4%) non-native plants. A total of 36 nationally and 39 provincially rare vascular plants were reported from Halton Region (Geomatics International 1991), out of a total of 542 for all of Ontario (Argus et al. 1982 - 1987).



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By comparison, Kaiser (1983) using Scoggan's (1978-1979) Flora of Canada, reports 2,555 vascular plants from Ontario, 27.4% of which are not native. Weber (1984) reports 1,334 vascular plant species from adjacent Peel County (boundaries of her study pre-date the incorporation of Peel as a Regional Municipality), with 36.4% being non-native.

#### 4.2.3 Fauna

The fauna of the Region has not received as much attention as the flora, but the Region is known to support most of the common animals of southern Ontario. Like the vegetation, the fauna shows a transition between southern species in the Niagara Forest Section and those more commonly found in the Huron-Ontario Forest Section. However, because of logging, farming and development, the natural distributions of many species have been significantly altered. During the process of settlement, large mammalian predators were hunted and have now disappeared entirely from Halton Region, as they have disappeared from much of southern Ontario. Nevertheless, the Niagara Escarpment and its associated forests provide nesting habitat for turkey vultures and other raptors as well as suitable area for forest species. The Escarpment also provides an important migratory route, particularly for raptors but probably also for many other birds. The broken terrain of the Escarpment provides caves for roosting bats and dens for animals such as porcupine and red fox.

The diversity of breeding birds is well represented in Halton Region with at least 111 species nesting in the Hilton Falls forest complex alone (EEAC 1978). During the approximately two hundred years of European settlement in southern Ontario, there have been substantial changes in forest cover, land use and agricultural practices which have resulted in significant changes in the fauna. Non-endemic species such as starlings and house sparrows have been introduced, while some game birds such as the wild turkey were more or less extirpated, although a reintroduction program was initiated by the OMNR in March of 1994 (Tuninga pers. comm. 1994).

The greatest diversity and number of herptile species are concentrated above the Niagara Escarpment. This can be attributed to the greater frequency of wetland communities and less disturbance from agriculture and urban development in this area of Halton (McKilwrick, pers. comm. 1994). Several species occurring within the region have been given priority rankings by the Natural Heritage Information Centre (NHIC), including the Jefferson Salamander (*Ambystoma jeffersonianum*), the Five-lined Skink (*Eumeces fasciatus*) and the Wood Turtle (*Clemmys insculpta*).

While many of the streams of Halton have been degraded to varying degrees by human activities, the Region still contains a number of high quality streams with associated aquatic communities. Certain reaches of all major streams in the Region support a full complement of aquatic insect groups including those which indicate the original faunal type and character of the stream before human settlement (EEAC 1978).

## HALTON REGION

### Environmentally Sensitive Areas

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While Lake Ontario lies outside Regional boundaries, the lake fisheries are affected by land use within the Halton Region. When the first European settlers came to Halton County, the fishery resources of Lake Ontario included significant populations of atlantic salmon, lake trout, whitefish, cisco, sturgeon, pickerel and pike. Today, the fish communities are very different due to exploitation of fish stocks, habitat destruction in spawning streams and marshes, the presence of toxic substances, and the introduction of many non-native species (EEAC 1978).

#### 4.2.4 Significant Flora and Fauna

Updated lists of significant flora and fauna are provided for each ESA in the 2002 report (Mirek Sharp & Associates 2002), and are incorporated into the descriptions for the ESAs in this report.

A number of Halton's ESAs have relatively rich floras. Hilton Falls (ESA #25) has the greatest number of native species (500), however, nine others have greater than 300 species. Generally, Halton's ESAs have very high quality floras as indicated by the Floristic Quality Index (FQI) and mean native coefficients<sup>1</sup>. Sites with FQIs over about 55 are considered to have high quality (for comparison, sites with an FQI over 40 are considered high quality in Mississauga). Of the 27 sites for which FQIs were calculated, 21 were greater than 55. Hilton Falls (#25) with 113 was the highest, and two others (Bronte Creek, #10; and Crawford Lake-Rattlesnake Point, #18) were both over 100.

Similarly, 7 of the 21 sites had mean coefficients over 5.00, which also indicates high quality woods. These high figures are partly a function of their size and the diversity of communities in them, which results in high species richness. They can fairly be compared to other areas with diverse communities, but not to sites with homogeneous habitat, which can be expected to have lower values, but may be equal in their quality. Only three sites (#41, 43 and 46) had FQIs lower than 40, and of these, Burlington Beach (#46) was designated primarily for Earth Science.

Twenty-three sites have provincially rare plants recorded from them. Those with the greatest number of provincially rare plants are: Clappison Escarpment Woods (#1): 9 species; Waterdown Escarpment Woods (#5): 11 species; Bronte Creek valley (#10): 1 species; Hilton Falls Complex (#25): 10 species. Hilton Falls also had the greatest number of regionally rare plants (88 species) with other highly ranked sites being Bronte Creek Valley (#10): 83 species; Crawford Lake - Rattlesnake Point Escarpment Woods (#18): 44 species; Sixteen Mile Creek Valley (#16): 42 species; and Clappison Escarpment Woods (#1), Sassafras Woods (#4) and Waterdown Escarpment Woods (#5) all with 38 species each. A total of thirty-eight of the ESAs had regionally significant plant species reported from them.

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<sup>1</sup> Floristic Quality Index (FQI) is a method for assessing the quality of a natural area based on its floristic composition (see Mirek Sharp & Associates 2002)

## HALTON REGION

### Environmentally Sensitive Areas

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ESAs designated primarily or solely on the basis of earth science criteria (#38, 39,40,44,45,46,48) do not have floristic data, with the exception of Burlington Beach (#46). However, apart from these, a few ESAs have very poorly documented floras (<100 species), including: #2,21,22,23,24,27,30,31,33,34,36,42 and 43. These sites should be a priority for fieldwork.

Of the 45 ESAs, 41 had at least one wildlife species recorded in it, however, only 26 had more than 50 species recorded, which is still considered a relatively low number. Although the avifauna may be well known for some ESAs (e.g., Bronte Creek #10, Hilton falls #25), with respect to fauna overall, the inventory information for Halton's ESAs is quite poor. Ten sites had provincially significant bird species, Bronte Creek Valley (#10) having 9. Nine sites (#5,7,8,9,17,18,25,29 and 32 had high numbers (>30) of breeding birds.

#### **5.0 ESA DESCRIPTIONS AND SUMMARIES**

Four tables have been prepared to provide ready reference to some of the basic characteristics and features represented in Halton's ESAs. Table 1 indicates the criteria which are fulfilled by each ESA (current to the 2002 report), Table 2 outlines the plant communities found within Halton's ESAs (from the 1995 report), Table 3 provides a summary of the earth science features found in Halton and represented within Halton's ESAs (from the 1995 report) and Table 4 provides the area, a list of other designations, and plant and animal species richness for each ESA (current to the 2002 report).

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## Environmentally Sensitive Areas

Table 1: Criteria Fulfilled by Each ESA (based on Mirek Sharp & Associates 2002)

ESA Name	Primary Criteria											Secondary Criteria			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Clappison Escarpment Woods	✓	✓				✓	✓				✓	✓		✓	
2. Bridgeview Valley						✓					✓	✓			
3. Grindstone Creek Valley	✓	✓	✓			✓	✓		✓		✓	✓	✓	✓	✓
4. Sassafras Woods	✓		✓	✓	✓	✓					✓	✓	✓	✓	✓
5. Waterdown Escarpment Woods	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓
6. Nelson Escarpment Woods						✓	✓					✓		✓	
7. Lake Medad and Medad Valley	✓					✓	✓		✓		✓	✓	✓		
8. Mount Nemo Escarpment Woods			✓		✓	✓	✓		✓		✓	✓		✓	✓
9. Lowville-Bronte Creek Escarpment Valley			✓		✓	✓	✓		✓		✓	✓	✓		✓
10. Bronte Creek Valley	✓	✓	✓		✓	✓	✓		✓		✓	✓	✓	✓	✓
11. Bronte Burloak Woods															
12. Fourteen Mile Creek Valley			✓			✓			✓		✓	✓			
13. Iroquois Shoreline Woods						✓	✓					✓	✓		✓
14. Wildflower Woods															
15. Joshua Creek Valley															
16. Sixteen Mile Creek Valley		✓	✓	✓		✓	✓		✓		✓	✓	✓	✓	
17. Milton Heights					✓	✓	✓		✓			✓	✓	✓	
18. Crawford Lake-Rattlesnake Point Escarpment Woods	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
19. Calcium Pits	✓					✓	✓		✓		✓	✓			✓
20. Guelph Junction Woods				✓		✓		✓			✓	✓	✓		

## HALTON REGION Environmentally Sensitive Areas

ESA Name	Primary Criteria											Secondary Criteria			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
21. Moffat Swamp									✓		✓	✓	✓		
22. Brookville Swamp											✓	✓			
23. Knatchbull Swamp								✓			✓	✓			
24. Blue Springs Swamp					✓						✓	✓			
25. Hilton Falls Complex	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26. Blue Springs Creek Valley		✓			✓	✓	✓		✓		✓	✓	✓	✓	
27. Fairy Lake Marsh					✓						✓	✓			
28. Acton Swamp								✓	✓	✓	✓	✓			
29. Speyside Escarpment Woods		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
30. Waterfall Woods		✓				✓	✓				✓		✓		
31. Limehouse Cliffs and Woods		✓				✓	✓		✓		✓	✓			
32. Silver Creek Valley	✓	✓	✓	✓		✓	✓		✓		✓	✓		✓	✓
33. Ballinafad Pond			✓		✓		✓					✓			
34. Snow's Creek Woods	✓	✓				✓	✓				✓	✓			✓
35. Terra Cotta Woods						✓	✓		✓			✓			✓
36. Georgetown Credit River Valley						✓			✓		✓	✓		✓	✓
37. Hungry Hollow Ravine					✓	✓					✓	✓	✓	✓	
38. Ballinafad Esker							✓								✓
39. Paris Moraine Complex							✓	✓						✓	✓
40. Joshua Creek Pop-Up							✓								✓
41. Stewarttown Woods									✓		✓	✓	✓		

# HALTON REGION

## Environmentally Sensitive Areas

ESA Name	Primary Criteria											Secondary Criteria			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
42. New Acton Swamp				✓							✓	✓			
43. Drumquin Woods							✓				✓	✓	✓		
44. Brookville Drumlin Field							✓								✓
45. Galt and Moffat Moraine							✓	✓							✓
46. Burlington Beach						✓	✓					✓			
47. Black Creek at Acton		✓									✓	✓			
48. Trafalgar Moraine							✓								

# HALTON REGION

## Environmentally Sensitive Areas

Table 2: Plant Communities in Halton and Representation Within Halton's ESAs (based on Geomatics International 1995 )

System/Class	Type	Association	ESA Occurrence
<b>Lacustrine (1)</b>			
Open Shallow Water (1.1)	Submerged Aquatic (1.1.1)		32,33
	Floating-Leaved Aquatic Community (1.1.2)		32,33
<b>Palustrine (3)</b>			
Marsh (3.1)	Deep Emergent (3.1.1)	cattail marsh (3.1.1.1)	3,7,9,10,12,18,25,27,32,34,37
Meadow Marsh (3.2)			4,6,20,35
		grass wet meadow (3.2.0.2)	18,24,25,26
		sedge wet meadow (3.2.0.3)	12
		forb rich wet meadow (3.2.0.4)	9,16
		shrub-rich wet meadow (3.2.0.5)	36,37
Fen (3.4)	Open Fen (3.4.1)	open marl fen (3.4.1.4)	26
Bog (3.5)	Open Bog (3.5.1)	open low shrub bog (3.5.1.4)	33
	Treed Bog (3.5.2)	treed sphagnum bog (3.5.2.1)	33
Swamp (3.6)	Thicket Swamp (Carr) (3.6.1)	willow swamp (3.6.1.2)	4,16,25,32,36
		winterberry-mountain holly thicket swamp (3.6.1.8)	33
	Conifer Forest Swamp (3.6.2)	larch swamp (3.6.2.1)	7
		southern white cedar swamp (3.6.2.2)	7,18,21,23,26,27,28,29,32,34,35,37
		larch-eastern white cedar swamp (3.6.2.3)	20
		southern boreal swamp (3.6.2.5)	26,27
		eastern hemlock swamp (3.6.2.6)	9
		eastern hemlock - eastern white cedar swamp (3.6.2.7)	35
	Broadleaf Forest Swamp (3.6.3)	red maple swamp (3.6.3.2)	16,20,23,24,28,29, 33
		silver maple swamp (3.6.3.3)	4,18,21,22,25,37
		American elm - mixed hardwood swamp (3.6.3.8)	32
		black ash swamp (3.6.3.10)	32
		American elm - mixed hardwood swamp (3.6.3.13)	4
crack willow-maple-elm (3.6.3.15)		9	
Mixed Conifer-Broadleaf Forest Swamp (3.6.4)	eastern white cedar - mixed hardwood swamp (3.6.4.3)	18,24,25,30,34,36	

# HALTON REGION

## Environmentally Sensitive Areas

System/Class	Type	Association	ESA Occurrence	
<b>Terrestrial (4)</b>				
Forest (4.1)	Coniferous Forest (4.1.1)	eastern white cedar forest (4.1.1.1)	8,26,27,28	
		eastern hemlock forest (4.1.1.3)	16	
		white pine - eastern hemlock forest (4.1.1.4)	18,25,32	
		white pine forest (4.1.1.7)	29	
	Broadleaf forest (4.1.2)			19
		willow forest (4.1.2.1) (two associations)		1,10
		Manitoba maple - mixed hardwood forest (4.1.2.2)		2
		American elm - mixed hardwood forest (4.1.2.8)		16
		wet - mesic oak forest (4.1.2.10)		
		rich black maple - mixed hardwood forest (4.1.2.12)		9
		rich hickory forest (4.1.2.13)		3
		butternut - American basswood forest (4.1.2.14)		8,18
		rich sugar maple - mixed hardwood forest (4.1.2.15)		2,4,6,8,10,12,16,17,18, 20,22,25,26,29, 30,31,32,33,35,37
		sugar maple - mixed American beech forest (4.1.2.17)		3,6,7,8,9,10,12,18, 28,34,35,36,
		sugar maple - red oak forest (4.1.2.18)		2,9,10,13,17,18,25, 30,31,36
		red maple - red oak forest (4.1.2.20)		16,20
		oak hickory forest (4.1.2.22)		4
		mixed oak forest (4.1.2.24)		4,10,13,16,25
		white oak forest (4.1.2.25)		4
		early successional - southern mixed hardwood forest (4.1.2.27)		8,16
large toothed aspen successional forest (4.1.2.28)		4,9,10,27		
trembling aspen successional forest (4.1.2.29)		4,25,32		
sugar maple - red maple forest (4.1.2.34)		10		
boreal birch - aspen successional forest (4.1.2.38)		17,18		



# HALTON REGION

## Environmentally Sensitive Areas

System/Class	Type	Association	ESA Occurrence
Forest (4.1)	Mixed Conifer - Broadleaf Forest (4.1.3)		12,20,21
		eastern hemlock - white pine - hardwood forest (4.1.3.1)	2,30,35
		eastern hemlock - yellow birch forest (4.1.3.2)	2
		eastern hemlock - mixed hardwood forest (4.1.3.3)	4,9,10,16,18,25,29,32,37
		white pine- / oak-/red maple forest (4.1.3.4)	35
		white pine - northern mixed hardwood forest (4.1.3.5)	28
		eastern white cedar - mixed hardwood forest (4.1.3.7)	28,31
		eastern white cedar - hemlock - mixed hardwood forest (4.1.3.8)	10,36
Shrub Thicket (4.2)			20
		sumac thicket (4.2.0.1)	9,10,25
		dogwood thicket (4.2.0.3)	4
		hawthorn thicket (4.2.0.4)	3,9,10,12,13,20,29,31,37
Tallgrass Prairie (4.4)	Mesic Prairie (4.4.2)	mesic prairie (4.4.2.1)	10
Primary (Great Lakes) Open Cliff/ Escarpment Faces (mid continental type) (4.7)	Alkaline Escarpment/Cliff (4.7.3)	warm dry alkaline escarpment/cliff (4.7.3.3)	8,19,25
<b>Agricultural (6)</b>			
Old Fields (6.1)		late successional >10 years (6.1.0.1)	3,4,6,8,9,10,12,13,16,17,18,25,26,31,32,35,36,37
<b>Non-Native Communities (7)</b>			
Old Orchards (7.2)			9,12
Old Plantations (7.3)	Conifer (7.3.1)		4,6,9,12,18,20,21,25,34,36
	Hardwood (7.3.2)		6

# HALTON REGION

## Environmentally Sensitive Areas

Table 3: Earth Science Features in Halton and Representation Within Halton's ESAs (based on Geomatics International 1995). An asterisk indicates a questionable or uncertain interpretation. Only those processes/landforms and formations documented in the literature or determined from field studies undertaken by Geomatics International Inc. have been identified. Processes/landforms and formations other than those shown may occur in ESAs but have not been documented.

Period	Epoch	Geomorphic Process	Landform or Geologic Formation	ESA Occurrence
Quaternary	Recent	Fluvial	Deeply Incised Valleys/Ravines	2,3,9,10,16,18,36
			Low Gradient Streams	3,4,26,31,35,40
			Other (eg. Alluvium)	3,9,10,15,16,26,31
		Lacustrine (Lake Ontario)	Beaches, bars and nearshore deposits	3
			Erosional Bluffs	3
		Karst	Dolomite Pavement	5,25,26,29
			Solution Caves	26
			Sinkholes	181,25,26
			Springs	1,5,6,7,8,9,17,18,19,25,26,29,31,32,34,35
			Flowstone (Speleothems)	8
		Mass Wasting	Cliff Collapse	
			Crevice Caves, Fissures	5,8,31
		Organic Deposits		7,16,20,21,22,23,24,27,28,29,33,34
		Ice Release Features (Bedrock Pop-Ups)		40
	Marl Deposits		7,19	
	Pleistocene	Glacial Lake Iroquois	Beaches, bars and nearshore deposits	3,10,
			Bluffs, terraces	13
		Peel Ponding	lake plain, silt/clay varves	10
			Beaches, bars and nearshore deposits	42
		Aeolian	sand dunes	
			loess	42*
		Glacial Re-entrants		9,18
		Meltwater Channels with Glaciofluvial Deposits		7,17,18,19,21,26,27,30,31,32,33,34,37
Meltwater Channel with Bedrock Scouring			7,18,26	
Meltwater Channel with Waterfall			19	
Roche Moutonnee		18*,25*		
Shallow Till/Bedrock Plains		18,19,20,25,29		

# HALTON REGION

## Environmentally Sensitive Areas

Period	Epoch	Geomorphic Process	Landform or Geologic Formation	ESA Occurrence
Quaternary	Pleistocene	Till Plains	Wentworth Till	21,22,23,24
			Halton Till	1,2,3,4,5,6,7,8,9,10,12,16,17,18,25,29,31,32,36,37
			Bevelled Till	
			Fluted Till	
		End Moraines	Trafalgar	16
			Waterdown	5,6,8,18
			Moffat	21,28,33,34
			Galt	21,23,
			Paris	24,39
		Drumlins		22,43
		Outwash Plains		9,18,32,35
		Outwash Fans		18
		Buried Valley		10
		Eskers		38
Kame/Kettle		9,21,33		
Escarpment		1,5,6,8,9,17,18,25,29,30,31,32,35		
Silurian		Lockport - Amabel Dolomite		1,5,8,17,18,19,25,26,29,30,31,32
		Rochester Shale		1,5
		Irondequoit Limestone		1,5
		Fossil Hill - Reynales Limestone		1,5,17,29,31,32,34
		Grimsby Formation		
		Thorold Sandstone		1,5,34
		Cabot Head Shale		29,31,32
		Manitoulin Limestone		3
		Whirlpool Sandstone		3,32,35
Ordovician		Queenston Shale		2,3,4,10,12,16,32,36,40
		Georgian Bay Shale		16,40
Undetermined		Bedrock Structural Features	faults	
			folds	40

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## Environmentally Sensitive Areas

Table 4: Characteristics of Halton's ESAs (based on information from Mirek Sharp & Associates 2002). Provincial status as follows: prov. = provincially significant, reg. = regionally significant, MAB = UNESCO's Man and the Biosphere Program. Areas with fewer than 100 plant species documented were recorded as such. An asterisk indicates where this table does not equal the database.

ESA Name	Size (ha)	Natural Area Designations				Flora						Fauna		
		Life ANSI	Earth ANSI	Wetland	MAB	Total Plants	No. Native	FQI <sup>1</sup>	Mean C <sup>1</sup>	Prov Rare	Rare in Halton <sup>2</sup>	Total Fauna	Prov Rare Birds	Prov Rare Fauna <sup>3</sup>
1. Clappison Escarpment Woods	105.42		reg.		Yes	418	302	83.15	4.78	9	38	64		
2. Bridgeview Valley	67.29					195*	146*			1	3	3		
3. Grindstone Creek Valley	325.97	prov. & reg.	prov.	prov.	Yes	457	361	94.68	5.00	7	64	114*	4	6
4. Sassafras Woods	143.02	prov.				429	333	88.49	4.86	8	38	115*	2	1
5. Waterdown Escarpment Woods	71.82	prov.	prov. & reg.		Yes	425	322	86.65	4.84	11	38	108*		1
6. Nelson Escarpment Woods	220.82	reg.	reg.		Yes	189*	136*	41.78	3.88	1	6	58		1
7. Lake Medad and Medad Valley	260.86	prov.	reg.	prov.	Yes	383*	333*	52.87	5.18		14	120*		1
8. Mount Nemo Escarpment Woods	257.79	prov.	prov.	local	Yes	354	278	77.93	4.69	5	16	102*		2
9. Lowville-Bronte Creek Escarpment Woods	373.25	prov. x2	prov.	local	Yes	295	221	71.71	4.82		19	105	1	5
10. Bronte Creek Valley	480.27	prov. & reg.	prov.	local	Yes	647	478	110.80	5.07	11	83	377*	1	10
11. Bronte Burloak Woods														
12. Fourteen Mile Creek Valley	67.52					256	171	55.21	4.22	3	14	98		1
13. Iroquois Shoreline Woods	39.54	prov.				249	190	61.54	4.48	3	13	64		
14. Wildflower Woods														
15. Joshua Creek Valley														
16. Sixteen Mile Creek Valley	1103.68	reg.		local		390	285	81.38	4.84	7	42	145*		2
17. Milton Heights	155.09		prov.		Yes	371	290	81.10	4.76	3	19	50		
18. Crawford Lake-Rattlesnake Point Escarpment Woods	664.62	prov.	prov.	prov. x2	Yes	510	420	104.77	5.14	4	44	182*	4	4
19. Calcium Pits	368.62	reg. x2	prov. & reg.	prov.	Yes	357	305	87.52	5.02	2	31	98*	1	2
20. Guelph Junction Woods	745.12			prov.	Yes	155	144	61.25	5.10	1	19	23*		
21. Moffat Swamp	100.26			prov.		<100*	<100*				1	7		
22. Brookville Swamp	116.05	reg.		prov.		<100*	<100*				6	4		

# HALTON REGION

## Environmentally Sensitive Areas

ESA Name	Size (ha)	Natural Area Designations				Flora						Fauna		
		Life ANSI	Earth ANSI	Wetland	MAB	Total Plants	No.	FQI <sup>1</sup>	C <sup>1</sup>	Prov Rare	Rare in Halton	Total Fauna	Prov Rare Birds	Prov Fauna <sup>3</sup>
23. Knatchbull Swamp	229.33	reg.		prov.		<100*	<100*					13*		
24. Blue Springs Swamp	201.73			prov.		<100*	<100*				2			
25. Hilton Falls Complex	2645.52	prov. x2	reg.	prov.	Yes	639	500	113.71	5.12	10	88	205	4	4
26. Blue Springs Creek Valley	683.29	reg.		prov.		201	159	59.48	4.72	2	23	43		1
27. Fairy Lake Marsh	68.29			prov.		214*	157*				4	52		
28. Acton Swamp	122.95			prov.		207*	162*	57.08	4.71		9			
29. Speyside Escarpment Woods	632.81	reg.		prov.	Yes	330	264	74.88	4.63	1	7	95*	1	2
30. Waterfall Woods	415.28			prov.	Yes	<100*	<100*			1	1	3		1
31. Limehouse Cliff and Woods	132.24			prov.	Yes	<100*	<100*				1	11		1
32. Silver Creek Valley	500.92	prov. x2	reg.	prov.	Yes	422	342	87.31	4.76	6	19	104	4	4
33. Ballinafad Pond	14.01	prov.		prov.		<100*	<100*				13			
34. Snows Creek Woods	141.20		reg.	prov.	Yes	504*	403*			1	9	97*	2	
35. Terra Cotta Woods	335.70	prov.		prov.	Yes	368	290	78.71	4.63		15	60	1	2
36. Georgetown Credit River Valley	219.64	reg.				<100*	<100*				4	186*		2
37. Hungry Hollow Ravine	192.83			prov.		323*	222*	43.64	4.41	1	19	109*		1
38. Ballinafad Esker	22.03			prov.	Yes	<100*	<100*					3		
39. Paris Moraine Complex	184.40			prov.		<100*	<100*							
40. Joshua Creek Pop-Up	8.88		prov.			<100*	<100*					7		
41. Stewartown Woods	32.01					230*	168*	39.01	3.88		3	67*		
42. New Acton Swamp	N/A			prov.		<100*	<100*				3			
43. Drumquin Woods	101.28					<100*	<100*	39.52	4.59		4	53*		
44. Brookville Drumlin Field	137.91			prov.		<100*	<100*					4		
45. Galt and Moffat Moraine	616.27		prov.	prov. x2		<100*	<100*					9		
46. Burlington Beach	10.58					235	101	32.84	3.27	2	21	14		
47. Black Creek at Acton	204.47			local		244	198	65.03	4.62		9	57		
48. Trafalgar Moraine	N/A		reg.			<100*	<100*							

<sup>1</sup> The FQI and Native Mean Coefficient are only calculated for those ESAs for which there are 100 or more plant species (see Mirek Sharp & Associates 2002 for a discussion).

<sup>2</sup> The total number of regionally rare plant species (Halton) include species that are also considered provincially rare.

<sup>3</sup> The total number of provincially rare fauna are exclusive of the total number of provincially rare breeding bird species.

## **ESA 1: Clappison Escarpment Woods**

### **General Description**

This ESA is dominated by the vertical bedrock exposures of the Niagara Escarpment. Halton Till (Pleistocene) covers the steep Queenston shale slopes which occur below the escarpment face (Karrow 1987a).

The predominant earth science feature of this ESA is the Niagara Escarpment. The escarpment landform has been designated a biosphere reserve by The UNESCO Man and the Biosphere Program, and hence, this ESA is part of an internationally significant landform. Although the formation of the escarpment pre-dates the last glaciation, its present morphology is predominantly due to erosion during the Wisconsin glaciation (Pleistocene). Since then, surficial erosion (Recent) due to rainfall (freeze-thaw and solution) and mass wasting (slumping) are the dominant geomorphic processes shaping the escarpment. Geological outcrops along the face and in the nearby King City Sand and Stone Quarry (in Hamilton-Wentworth) include representation of the Silurian (Lockport, Rochester, Irondequoit, Reynales and Thorold Formations) and Ordovician (Queenston Formation). These outcrops are considered provincially significant as they represent a transition zone, with the Lockport grading into the Amabel (toward the north) and having one of the most northerly exposures of the Rochester Formation (OMNR 1976b, 1983a). The King City Quarry, located in Hamilton-Wentworth, has been designated as a provincially significant Earth Science ANSI by the Ministry of Natural Resources (OMNR 1983a).

The south-facing slope is steep and rather thinly wooded on the western part. In the eastern portion, the deeper red clay soils support a dense hardwood forest in undulating terrain. Varga and Allen (1990) have indicated that this is one of the top botanical sites within the Region. The area is the source of seepage springs for intermittent tributaries to lower Grindstone Creek (Ecologistics 1977).

# HALTON REGION

## Environmentally Sensitive Areas

ESA N° 1

Size:	105 hectares
Plant Species (total #):	418
Plant communities:	Broadleaf Forest (4.1.2.1)
Animal Species:	Herptiles: 8 Birds: 21(B), 20(P), 4(O) Mammals: 11
Earth Science Features:	Escarpment
Other Designations:	Regionally Significant Life Science ANSI UNESCO MAB Reserve Niagara Escarpment Planning Area Parkway Belt West Area
Ownership:	Private & Public (MBS)

### Criteria Fulfilled

#### Primary Criteria

- 1) Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

This ESA is reported to have a native vascular plant species richness of 302, which ranks it ninth among Halton's ESAs with respect to vascular plant species richness.

- 2) Areas that provide functional links among two or more adjacent natural systems.**

These woods provide a connection between Bridgeview Valley ESA 2 and Grindstone Creek Valley ESA 3.

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

Nationally and/or provincially rare plant species are found in the extreme south-eastern section and include:

Smooth Yellow False Foxglove (*Aureolaria virginica*)  
Pignut Hickory (*Carya glabra*)  
American Chestnut (*Castanea dentata*)

# HALTON REGION

## Environmentally Sensitive Areas

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ESA N° 1

Large-bracted Tick-trefoil (*Desmodium cuspidatum var. cuspidatum*)  
American Columbo (*Frasera caroliniensis*)  
Red Mulberry (*Morus rubra*)  
Finely-pilose Evening-primrose (*Oenothera pilosella ssp. pilosella*)  
Languid Spear Grass (*Poa languida*)  
Perfoliate Bellwort (*Uvularia perfoliata*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The ESA encompasses a portion of the internationally, nationally and provincially significant Niagara Escarpment. A road cut there offers an excellent opportunity for geological study (Tovell 1992). The following bedrock formations are well exposed and are considered to be provincially significant: Goat Island and Gasport Members of the Lockport Formation and the Rochester, Irondequoit and Reynales formation (Cowell and Woerns 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The area is the source of seepage springs for intermittent tributaries to lower Grindstone Creek (Ecologistics 1977).

### **Secondary Criteria**

**12) Areas that contain regionally rare plants.**

The following regionally rare plant species are found in the ESA:

Yellow Giant Hyssop (*Agastache nepetoides*)  
Heath Aster (*Aster ericoides*)  
Arrow-Leaved Aster (*Aster urophyllus*)  
Tall Bellflower (*Campanula americana*)  
Harebell (*Campanula rotundifolia*)  
Small Yellow Sedge (*Carex cryptolepis*)  
Sedge (*Carex normalis*)  
Sedge (*Carex prasina*)  
Sedge (*Carex sprengelii*)  
Pignut Hickory (*Carya glabra*)  
American Chestnut (*Castanea dentata*)  
Hawthorn (*Crataegus calpodendron*)  
Large-bracted Tick-trefoil (*Desmodium cuspidatum var. cuspidatum*)  
Tick-trefoil (*Desmodium paniculatum*)



Wild Yam-root (*Dioscorea quaternata*)  
Robins Plantain (*Erigeron pulchellus*)  
American Columbo (*Frasera caroliniensis*)  
Eastern Red Cedar (*Juniperus virginiana*)  
Hairy Bush-clover (*Lespedeza hirta*)  
Bush-Clover (*Lespedeza intermedia*)  
Wild Crabapple (*Malus coronaria*)  
Red Mulberry (*Morus rubra*)  
Finely-pilose Evening-primrose (*Oenothera pilosella* ssp. *pilosella*)  
Smooth Sweet-cicely (*Osmorhiza longistylis*)  
Clammy Ground-cherry (*Physalis heterophylla*)  
Whorled Milkwort (*Polygala verticillata*)  
Smartweed (*Polygonum punctatum*)  
Jumpseed (*Polygonum virginianum*)  
Chinquapin Oak (*Quercus muhlenbergii*)  
Prickly Rose (*Rosa acicularis* ssp. *sayi*)  
Swamp Rose (*Rosa palustris*)  
Black Willow (*Salix nigra*)  
Sassafras (*Sassafras albidum*)  
Bur Cucumber (*Sicyos angulatus*)  
Skunk Cabbage (*Symplocarpus foetidus*)  
Wood Sage (*Teucrium canadense* ssp. *canadense*)  
Perfoliate Bellwort (*Uvularia perfoliata*)  
Summer Grape (*Vitis aestivalis*)

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The valley lands in the eastern section have high aesthetic values and the exposed sections of the Escarpment offer spectacular views of Hamilton, west Burlington, and Escarpment features to the south and west across the valley.

**Sources of Information**

Armour, E. et al. 1979.  
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Cowell, D. and N. Woerns. 1977.  
Crins, W.J. 1986.  
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Environmental Protection Service, Ontario Region. 1977.  
Heagy, A.E. (ed.). 1993.  
Kaiser, J. 1984.  
Karrow, P.F. 1987a

# HALTON REGION

## Environmentally Sensitive Areas

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ESA N° 1

Ontario Ministry of Natural Resources. 1976b, 1983a.  
Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1981.  
Sutherland, D. 1981.  
Varga, S. and G.M. Allen. 1990.

**ESA 2: Bridgeview Valley**

**General Description**

Bridgeview Valley is a deep, narrow, steep-sided ravine which runs south from the Escarpment, and contains a tributary to Grindstone Creek. The often near-vertical banks are composed of heavy red shale and clay soil, and severe erosion and slippage is evident throughout the area. The valley floor is very narrow, particularly in the north, where it consists of the creek bed itself, but widens in the south to support a small floodplain community.

The east bank supports a good quality maturing forest of maple, oak and hickory in the south and hemlock to the north. Good quality mixed forest is also found on the west bank, with mature pine and hemlock, maple and birch. Although small and disturbed, the unusual Carolinian habitat and rare species found here warrant protection from development, particularly along its banks, to avoid destruction of delicate flora, and to prevent erosion due to vegetation clearing (EEAC 1978).

Size:	67 hectares
Plant Species (total #):	195*
Plant communities:	Manitoba Maple-Mixed Hardwood Forest (4.1.2.2) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-Mixed Oak Forest (4.1.2.18) Eastern Hemlock-White Pine-Hardwood Forest (4.1.3.1) Eastern Hemlock-Yellow Birch Forest (4.1.3.2)
Earth Science Features:	No published information
Animal Species:	Heptiles: No published information Birds: No published information Mammals: No published information Fish: 3
Other Designations:	Parkway Belt West Area
Ownership:	Private

\* Total number of plant species does not currently correspond with database

**Criteria Fulfilled**

**Primary Criteria**

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following plants are listed as nationally rare and provincially rare:

Pignut Hickory (*Carya glabra*)

- 11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The well-treed margins of the intermittent creek are important to maintaining water temperature.

**Secondary Criteria**

- 12) Areas that contain regionally rare plants.**

The following regionally rare plants were found within this ESA:

Pignut Hickory (*Carya glabra*)

Chinquapin Oak (*Quercus muhlenbergii*)

Hawthorn (*Crataegus succulenta*)

**Sources of Information**

Armour, E. et al. 1979.

Crins, W.J. 1986.

Ecological and Environmental Advisory Committee. 1978.

Ecologistics Ltd. 1977.

Environmental Protection Service, Ontario Region. 1977.

Jakab, S., L. Densmore, and S. Warren. 1980.

Kaiser, J. 1984.

Regional Municipality of Halton. 1978, 1982.

Royal Botanical Gardens. 1977, 1981.

Sutherland, D. 1981.

### **ESA 3: Grindstone Creek Valley**

#### **General Description**

Grindstone Creek is an incised stream which has eroded deeply into the Queenston Shale. It has a steep gradient of 19 m/km where it crosses the shale, decreasing to 2.8 m/km in its lower reaches (Karrow 1987a). The mouth of the creek is flooded due to rising water levels in Lake Ontario. The level of the lake has been rising slightly but continuously over the past 10 000 years as a result of isostatic rebound (Karrow 1987a). Surficial deposits located in and immediately adjacent to this ESA include Halton Till (Pleistocene), glacial Lake Iroquois nearshore sands and the Aldershot Bar (Pleistocene), and alluvial deposits from the river (Recent).

The Aldershot Bar is a large sand and gravel bayhead bar which currently forms the southeast bank of the lower portion of Grindstone Creek. It is contemporaneous with the Hamilton Bar which created Cootes Paradise. The presence of the bar prevented Grindstone Creek from finding a more direct route to the lake (Hamilton Harbour), redirecting the creek toward the southwest and increasing its length by approximately 2 km.

Grindstone Creek Valley is the major basin for the extreme southwest part of Halton Region, draining, in part, the highly erodible red clay soils so characteristic of the area. While several small intermittent tributaries arise at the base of the Escarpment and flow through at least four ESAs, the major headwaters of Grindstone Creek arise in Hamilton-Wentworth Region. The creek flows south from Waterdown, deeply dissecting the Escarpment at the Regional Boundary, and forming a narrow sheltered valley which broadens into a well-developed flood plain extending from just north of Highway 403 to Hamilton Harbour. The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

The valley sides are generally heavily wooded throughout, and Varga and Allen (1990) list it as one of the top botanical sites in Halton Region. The flood plain in the southern part has various land uses ranging from housing to recently developed vegetation communities. The valley is an excellent area for nesting and migrating birds and has been designated as a provincially significant Life Science ANSI, Grindstone Creek Valley (OMNR 1991a).

The eastern fox snake (*Elaphe vulpina gloydi*) has been reported from the lower Grindstone (Lamoureux in EEAC 1978). The eastern fox snake is rare provincially and regionally. Because of declining habitats, every effort should be made to protect localities where it occurs.

## HALTON REGION Environmentally Sensitive Areas Update

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### ESA N° 3

The area has been identified by the Hamilton Remedial Action Plan (Ontario Ministry of the Environment et al. 1992) for restoration activities. The primary focus of this area is to restore emergent marshes at the lower end of the Creek which will include the construction of carp exclusion barriers as well as active planting, and the enhancement of pike spawning habitat (Beak Consultants et al. 1993). The creek is important for migratory salmonids and also provides suitable spawning for rainbow trout (*Oncorhynchus mykiss*) (Axon pers. comm. 1992-93). The area is very popular with local fishermen as salmon run the creek in the fall (Taylor pers. obs. 1992).

Past and continuing development in the drainage area has resulted in erosion and subsequent turbidity and siltation of the Creek. One source of significant amounts of suspended solids may be traced to the activities of a large cement manufacturing company in the area, as well as resuspension of bottom sediments by the large carp population. There is considerable treated effluent from the Waterdown sewage treatment plant. Storm water causes some erosion of the banks along Grindstone Creek. Storm water causes some erosion in the banks of Grindstone itself (EEAC 1978).

The Royal Botanical Gardens owns most of this ESA in the area west of Unsworth Avenue to Hamilton Harbour (Hendrie Valley). This valley has been identified by OMNR as a regionally significant life science ANSI (Gould 1989). Approximately 65% of this ESA is presently in public ownership with large portions between Waterdown Falls and Hidden Valley owned by the Management Board Secretariat. The upper portion of the ESA, from Waterdown south for about 2.4 kilometres, has been proposed as a Nature Reserve because of the geological exposures, Waterdown Falls and incised valley, all of which are within the provincially significant Earth Science ANSI (Grindstone Creek). A provincially significant wetland complex also exists within the ESA.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 3

Size:	326 hectares
Plant Species (total #):	457
Plant communities:	Cattail Marsh (3.1.1.1) Rich Hickory Forest (4.1.2.13) Sugar Maple-American Beech Forest (4.1.2.17) Hawthorn Thicket (4.2.0.4) Old Fields (6.1)
Animal Species:	Heptiles: 10 Birds: 15 (B), 27(P), 8(O) Mammals: 6 Fish: 48
Earth Science Features:	Escarpment Incised Valley
Other Designations:	UNESCO MAB Reserve Provincially and Regionally Significant Life Science ANSIs Provincially Significant Earth Science ANSI Provincially Significant Wetland Complex Parkway Belt West Area
Ownership:	65% Public, 35% Private

### Criteria Fulfilled

#### Primary Criteria

- 1) Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

Over 100 species of nesting birds have been recorded including rather shy species such as barred owl (*Strix varia*). Over the years, 268 bird species have been recorded as migrants (Hamilton Naturalist's Club 1975, cited in EEAC 1978). The area is also reported to support 361 species of native vascular plants, which ranks it fourth with respect to species richness among Halton's ESAs.

- 2) Areas that provide functional links among two or more adjacent natural systems.**

The valley provides a continuous wooded linkage from Hamilton Harbour to the Escarpment. The lower Grindstone Creek is an important stopover area for migratory birds in the Region, according to the number of species sighted. Over the years, 268

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 3

species have been recorded as migrants (Hamilton Naturalist's Club 1975, cited in EEAC 1978).

### 3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.

The valley contains a number of distinct biological communities, ranging from Escarpment habitats to floodplain and aquatic habitats. The large number of breeding bird species (>100 species reported) indicates a wide diversity of habitats occurring within a relatively small area.

### 6) Areas that contain plant and/or animal species that are rare provincially or nationally.

The following nationally and provincially rare plant species are found in this ESA:

Schreber's Aster (*Aster schreberi*)  
American Chestnut (*Castanea dentata*)  
Fullers Hawthorn (*Crataegus fulleriana*)  
Large-bracted Tick-trefoil (*Desmodium cuspidatum* var. *cuspidatum*)  
American Columbo (*Frasera caroliniensis*)  
Hispid Buttercup (*Ranunculus hispidus* var. *hispidus*)  
Melica-leaf False Oats (*Trisetum melicoides*)

The following nationally and/or provincially rare animal species are found in this ESA:

Jefferson Salamander (*Ambystoma jeffersonianum*)  
Blanding's Turtle (*Emydoidea blandingii*)  
Spiny Softshell (*Apalone spinifera*)  
Eastern Fox Snake (*Elaphe gloydi*)  
Black Bullhead (*Ameiurus melas*)  
White Crappie (*Pomoxis annularis*)  
Least Bittern (*Ixobrychus exilis*)  
Henslow's Sparrow (*Ammodramus henslowii*)  
Cerulean Warbler (*Dendroica cerulea*)  
Yellow-Breasted Chat (*Icteria virens*)



**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The very northern portion is an Escarpment feature with excellent exposures of Manitoulin, Whirlpool and Queenston formations. This is one of the deepest river valleys in the Queenston shale. Also well exposed is the Halton Till overburden (Cowell and Woerns 1977).

The Grindstone Creek Falls has excellent outcrops of Silurian (Manitoulin and Whirlpool Formations) overlying Ordovician (Queenston Formation) bedrock. Of particular interest is the clear view of the Ordovician/Silurian contact at this site.

Grindstone Creek Valley has also been identified as significant for its representation of fluvial erosional processes, whereby a deeply incised V-shaped river valley has been cut into shale bedrock (Axon 1989b, Gould 1989). The valley has been designated as a provincially significant Earth Science ANSI (OMNR 1976b, 1983a). It is one of the deepest river valleys within the Queenston Formation, exposing both the shale and overlying Halton Till.

**9) Areas that are determined to be significant groundwater discharge areas.**

Grindstone Creek serves as a zone of major groundwater discharge, especially along the Escarpment face (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The well-vegetated stream margins and wetlands contribute to maintaining surface water quality.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This area includes the following regionally rare plants:

Sweet-flag (*Acorus americanus*)  
Giant Ragweed (*Ambrosia trifida*)  
Serviceberry (*Amelanchier alnifolia*)  
Big Bluestem (*Andropogon gerardii*)  
Butterfly-weed (*Asclepias tuberosa*)  
Heath Aster (*Aster ericoides*)  
Tall Flat-top White Aster (*Aster umbellatus*)

## HALTON REGION Environmentally Sensitive Areas Update

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ESA N° 3

Arrow-leaved Aster (*Aster urophyllus*)  
Aster (*Aster x amethystinus*)  
Long-awned Wood Grass (*Brachyelytrum erectum*)  
Kalm's Brome (*Bromus kalmii*)  
Harebell (*Campanula rotundifolia*)  
Cuckoo-flower (*Cardamine pratensis*)  
Sedge (*Carex atherodes*)  
Shorter Sedge (*Carex brevior*)  
Sedge (*Carex cephaloidea*)  
Sedge (*Carex grayi*)  
Narrow-leaved Sedge (*Carex grisea*)  
Sedge (*Carex normalis*)  
Sedge (*Carex scoparia*)  
American Chestnut (*Castanea dentata*)  
Hornwort (*Ceratophyllum demersum*)  
Hawthorn (*Crataegus calpodendron*)  
Dodges Hawthorn (*Crataegus dodgei*)  
Fullers Hawthorn (*Crataegus fulleriana*)  
Umbrella Sedge (*Cyperus strigosus*)  
Large-bracted Tick-trefoil (*Desmodium cuspidatum var. cuspidatum*)  
Wild Yam-root (*Dioscorea quaternata*)  
Common Waterweed (*Elodea canadensis*)  
River Bank Wild-rye (*Elymus riparius*)  
Slender Wheat Grass (*Elymus trachycaulus*)  
American Columbo (*Frasera caroliniensis*)  
Stiff Marsh Bedstraw (*Galium tinctorium*)  
Rough Hawkweed (*Hieracium scabrum*)  
Common Juniper (*Juniperus communis*)  
Eastern Red Cedar (*Juniperus virginiana*)  
Star Duckweed (*Lemna trisulca*)  
Round-headed Bush-clover (*Lespedeza capitata*)  
Hairy Honeysuckle (*Lonicera hirsuta*)  
One-flowered Pyrola (*Moneses uniflora*)  
Slender-leaved Panic Grass (*Panicum linearifolium*)  
Bluegrass (*Poa alsodes*)  
Water Smartweed (*Polygonum amphibium*)  
Smartweed (*Polygonum punctatum*)  
Jumpseed (*Polygonum virginianum*)  
Pondweed (*Potamogeton nodosus*)  
Flat-stemmed Pondweed (*Potamogeton zosteriformis*)  
Chinquapin Oak (*Quercus muhlenbergii*)  
Hispid Buttercup (*Ranunculus hispidus var. hispidus*)  
Bristly Crowfoot (*Ranunculus pensylvanicus*)

Great Water Dock (*Rumex orbiculatus*)  
Prairie Willow (*Salix humilis*)  
Black Willow (*Salix nigra*)  
Clustered Snakeroot (*Sanicula odorata*)  
Sassafras (*Sassafras albidum*)  
Bur Cucumber (*Sicyos angulatus*)  
Common Bur-reed (*Sparganium eurycarpum*)  
Skunk Cabbage (*Symplocarpus foetidus*)  
Wood Sage (*Teucrium canadense* ssp. *canadense*)  
Melica-leaf False Oats (*Trisetum melicoides*)  
Glaucous Cattail (*Typha x glauca*)  
Southern Arrow-wood (*Viburnum recognitum*)  
Summer Grape (*Vitis aestivalis*)  
Horned Pondweed (*Zannichellia palustris*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

It appears that this area contains high quality assemblages of plant and animal species but field work needs to be undertaken to verify this. The present data indicates that 80 percent of the 457 plant species identified are native, but the total number of species may be revised upward considerably. Varga and Allen (1990) identify this site as one of the top botanical sites in the Region.

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The valley, by nature of its location and relatively undeveloped margins, provides an attractive experience for hikers, birdwatchers and fishermen.

**15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The large number of bird species using Grindstone Creek Valley makes this area excellent for bird-watching and migration studies. The habitat diversity and biological community development render the lower Grindstone very suitable for field studies, and it is used for this purpose by the Royal Botanical Gardens (EEAC 1978). The restoration activities in this area of Hamilton Harbour make it an excellent area for conservation education studies and research in restoration ecology.

**Sources of Information**

Armour, E. et al. 1979.  
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Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1981.  
Sutherland, D. 1981.  
Varga, S. and G.M. Allen. 1990.

## **ESA 4: Sassafras Woods**

### **General Description**

Sassafras Woods supports a secondary growth hardwood forest with an overstorey of mature white pine on a gentle south-facing slope. This is one of the few remaining sizable woodlots typical of the woodland that once covered most of the Region south of the Escarpment. It has been designated a Carolinian Canada site (Allen et al. 1990). Five small valley systems extend into the area along a north-south axis producing a profile of plateaus alternating with shallow depressions. Soils are deep, red clay. The forests of the plateau are quite immature but are older in the depressions. Sugar maple is dominant, with shagbark hickory, witch hazel, American hornbeam, and red oak well represented (Lindsay 1990). This is one of the top botanical sites in Halton Region (Varga and Allen 1990) and has been designated a provincially significant Life Science ANSI (OMNR 1991a, Varga 1993).

Uncommon birds reported here include whip poor-will (*Caprimulgus vociferus*) which is classified as possibly breeding in the area, golden-crowned kinglet (*Regulus satrapa*) which is a confirmed breeding bird in this area, and ruby-crowned kinglet (*Regulus calendula*) for which there is no evidence of breeding within the ESA (Cadman et al. 1987, M. Ilyniak 1977 in litt., cited in EEAC 1978).

This relatively large woodlot is transected by three hydro lines (EEAC 1978). At present, the major impact on the area is noise. Traffic from Highway 403 and the North Service Road, as well as trail bikes in the eastern section of the woodlot are major sources of noise. The trail bikes have also disturbed soil and vegetation especially on the east side of the western valley. This unnecessary destruction of habitat is a continuing problem and may seriously destroy the woodlot if it is not curtailed. Related to this is the residential development which is concentrated along the western valley. The ESA boundary follows very closely the provincially significant Life Science ANSI boundary.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 4

Size:	143 hectares
Plant Species (total #):	429
Plant communities:	Meadow Marsh (3.2) Thicket Swamp (3.6.1) Broadleaf Forest Swamp (3.6.3) American Elm-Mixed Hardwood Swamp (3.6.3.13) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Oak-Hickory Forest (4.1.2.22) Mixed Oak Forest (4.1.2.24) White Oak Forest (4.1.2.25) Large Tooth Aspen Successional Forest (4.1.2.28) Trembling Aspen Successional Forest (4.1.2.29) Eastern Hemlock-Mixed Hardwood Forest (4.1.3.3) Dogwood Thicket (4.2.0.3) Late Successional Old Field (6.1.0.1) Conifer Plantation (7.3.1)
Animal Species:	Herptiles: 18 Birds: 13(B), 45(P), 18(O) Mammals: 19 Fish: 2
Earth Science Features:	No published information
Other Designations:	Provincially Significant Life Science ANSI Carolinian Canada Site Parkway Belt West Area
Ownership:	Private

### Criteria Fulfilled

#### Primary Criteria

- 1) Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

The large number of native vascular plants recorded from this ESA (333 species) (Varga 1993) make it regionally significant. It ranks sixth with respect to plant species richness among Halton's ESAs.

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 4

**3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

Varga reported a total of 28 communities for this ESA. These were reduced to 14 when the classification of Kavanagh and McKay-Kuja (1992) was applied, of which 13 are native communities. This is a high number of communities in the context of Halton region.

**4) Areas that contain large (in a regional context), relatively undisturbed expanses of natural, native plant communities, in particular those that support interior forest conditions.**

Although mostly second growth, this forest has developed from natural regrowth and there have been few human intrusions. It is representative of the woodland which once covered most of the Region south of the Escarpment (EEAC 1978). It has been designated a provincially significant Life Science ANSI (OMNR 1991a).

**5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

The long growing season and the young wooded sections of Sassafras Woods provide suitable conditions for Carolinian species such as sassafras (*Sassafras albidum*) and eastern flowering dogwood (*Cornus florida*). These woods contain the largest number and best quality of sassafras and flowering dogwood in Halton Region. These Carolinian species are near the northern limit of their range in Ontario and present an important contribution to the Region's flora (EEAC 1978).

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

Nationally and provincially rare plant species found within the ESA include:

Pignut Hickory (*Carya glabra*)  
American Chestnut (*Castanea dentata*)  
Large-bracted Tick-trefoil (*Desmodium cuspidatum* var. *cuspidatum*)  
American Columbo (*Frasera caroliniensis*)  
Spreading Panic Grass (*Panicum dichotomum*)  
Hispid Buttercup (*Ranunculus hispidus* var. *hispidus*)  
Sharp-leaved Goldenrod (*Solidago arguta*)  
Rue-anemone (*Thalictrum thalictroides*)

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 4

The following nationally and or provincially rare animal species are found in this ESA:

Jefferson Salamander (*Ambystoma jeffersonianum*)  
Cerulean Warbler (*Dendroica cerulea*)  
Tufted Titmouse (*Baeolophus bicolor*)

### 11) Areas that contribute significantly to maintaining surface water quality and quantity.

The well-forested area along much of Falcon Creek and the tributaries to Grindstone Creek contributes to maintaining water quality.

### Secondary Criteria

### 12) Areas that contain regionally rare plants.

This ESA contains the following regionally rare plants:

Big Bluestem (*Andropogon gerardii*)  
Heath Aster (*Aster ericoides*)  
Sky-blue Aster (*Aster oolentangiensis*)  
Arrow-leaved Aster (*Aster urophyllus*)  
Long-awned Wood Grass (*Brachyelytrum erectum*)  
Sedge (*Carex prasina*)  
Sedge (*Carex rugosperma*)  
Pignut Hickory (*Carya glabra*)  
American Chestnut (*Castanea dentata*)  
Spotted Coral-Root (*Corallorhiza maculata*)  
Hawthorn (*Crataegus succulenta*)  
Large-bracted Tick-trefoil (*Desmodium cuspidatum* var. *cuspidatum*)  
Tick-trefoil (*Desmodium paniculatum*)  
Smooth Scouring Rush (*Equisetum laevigatum*)  
Fireweed (*Erechtites hieracifolia*)  
Robin's Plantain (*Erigeron pulchellus*)  
American Columbo (*Frasera caroliniensis*)  
Eastern Red Cedar (*Juniperus virginiana*)  
Hairy Bush-clover (*Lespedeza hirta*)  
Bush-clover (*Lespedeza intermedia*)  
Wood Lily (*Lilium philadelphicum*)  
Interrupted Fern (*Osmunda claytoniana*)  
Spreading Panic Grass (*Panicum dichotomum*)  
Slender-leaved Panic Grass (*Panicum linearifolium*)  
Slender Panic Grass (*Panicum xanthophysum*)



Whorled Milkwort (*Polygala verticillata*)  
Jumpseed (*Polygonum virginianum*)  
Round-leaved Pyrola (*Pyrola americana*)  
Hispid Buttercup (*Ranunculus hispidus* var. *hispidus*)  
Fragrant Sumac (*Rhus aromatica*)  
Northern Dewberry (*Rubus flagellaris*)  
Black Willow (*Salix nigra*)  
Sassafras (*Sassafras albidum*)  
Sharp-leaved Goldenrod (*Solidago arguta*)  
Late Goldenrod (*Solidago gigantea*)  
Rue-Anemone (*Thalictrum thalictroides*)  
Arrow-Leaved Violet (*Viola sagittata*)  
Summer Grape (*Vitis aestivalis*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

This area is well known as an excellent example of Carolinian forest. The area has also been identified as one of the top botanical sites within Halton (Varga and Allen 1990).

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The woods provide an aesthetic woodland experience which is becoming less common in this area of Ontario and should be protected from further impact.

**15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The School of Landscape Architecture at the University of Guelph has lead field trips in this ESA and the Conservation Authority leads nature hikes to these woods (Axon pers. comm. 1992-93).

**Sources of Information**

Allen, G.M. et al. 1990.  
Armour, E. et al. 1979.  
Axon, B.K. 1989b.  
Cameron, D. 1984.  
Cameron, D. and M. Shea. 1983a, 1983c.  
Crins, W.J. 1986.  
Duncan, J. 1989.

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 4

Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Environmental Protection Service, Ontario Region. 1977.  
Gould, J. 1989.  
Kaiser, J. 1984.  
Lindsay, K.M. 1990.  
McCartney, M. and M. Shea. 1983c.  
Mullen, L., et al. 1982.  
Ontario Ministry of Natural Resources. 1991a.  
Regional Municipality of Halton. 1978, 1982.  
Riley et al. 1996  
Royal Botanical Gardens. 1977, 1981.  
Sutherland, D. 1981.  
Varga, S. 1993.  
Varga, S. and G.M. Allen. 1990.

## **ESA 5: Waterdown Escarpment Woods**

### **General Description**

The Waterdown Escarpment Woods ESA is dominated by the vertical bedrock exposures of the Niagara Escarpment. The escarpment landform has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program and, hence, this ESA is part of an internationally significant landform. Although the formation of the escarpment pre-dates the last glaciation, its present morphology is predominantly due to erosion during the Wisconsin glaciation (Pleistocene). The old Nelson Quarry located within this ESA is identified as a provincially significant Earth Science ANSI on the basis of excellent exposures of Amabel, Rochester, Irondequoit, Reynales and Thorold Formations (OMNR 1994)

This largely wooded Escarpment feature contains several very high quality mature plant communities and a good diversity of habitats (EEAC 1978) and has been designated as a regionally significant Life Science ANSI (OMNR 1991b). Varga and Allen (1990) indicate that this area is one of the top botanical sites within Halton. Areas of mature deciduous forest and Escarpment habitat are interspersed with open field environments, some of which have been damaged by trail bikes or other recreational vehicles. The abandoned Nelson Quarry contains a pond and marsh area, supplied throughout the summer months by seepage from the toe of the quarry face and through accumulation of rain water. The environment to the west of the quarry exhibits extensive dolomite outcroppings and supports characteristic plant species.

The eastern woodlot in this ESA has been damaged by recreational vehicles, reducing the ground cover significantly. Housing development in the area has resulted in greater human activity in the area and greater usage of the ESA. The eastern part of the ESA has been proposed as a municipal park (Landplan undated).

This site is also designated as provincially significant life science ANSI, Sassafras-Waterdown Woods (Riley et al. 1996) and as a regionally significant earth science ANSI, Waterdown Moraines.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 5

Size:	72 hectares
Plant Species (total #):	425
Plant communities:	No published information
Animal Species:	Herptiles: 16 Birds: 22(B), 35(P), 26(O) Mammals: 9
Earth Science Features:	Escarpment Dolomite Pavement Crevice Caves, Fissures Moraine
Other Designations:	UNESCO MAB Reserve Provincially Significant Life Science ANSI Provincially and Regionally Significant Earth Science ANSI Parkway Belt West Area
Ownership:	Mainly Private, some MBS holdings

### Criteria Fulfilled

#### Primary Criteria

- 1) Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

This area has been reported to contain 322 native vascular plants and ranks seventh among Halton's ESAs for plant species richness.

- 2) Areas that provide functional links among two or more adjacent natural systems.**

This ESA provides a linkage between Sassafras Woods, Grindstone Creek and Clappison Woods.

- 3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

Axon (1989b) reports 22 communities (plus anthropomorphic areas) ranging from mature forest to old fields and including a range of successional stages. This is a high number of communities for one area in the context of Halton Region.

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 5

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The ESA contains the following nationally and provincially rare species:

Jefferson salamander (*Ambystoma jeffersonianum*)

Smooth False Foxglove (*Aureolaria flava*)

Smooth Yellow False Foxglove (*Aureolaria virginica*)

Slender Sedge (*Carex gracilescens*)

Pignut Hickory (*Carya glabra*)

Hawthorn (*Crataegus scabrada*)

Large-bracted Tick-trefoil (*Desmodium cuspidatum* var. *cuspidatum*)

Burning Bush (*Euonymus atropurpurea*)

Green Violet (*Hybanthus concolor*)

Red Mulberry (*Morus rubra*)

Ginseng (*Panax quinquefolius*)

Rue-Anemone (*Thalictrum thalictroides*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. The old Nelson Quarry is identified as a provincially significant Earth Science ANSI on the basis of excellent exposures of Amabel, Rochester, Irondequoit, Reynales and Thorold Formations (OMNR 1994). Of particular interest is the dolomite cap rock which consists of the Amabel Formation at this location. The quarry has one of the most southerly exposures of the Amabel reefal complex. To the west and south it grades into the Lockport. This site also illustrates the northward thinning of the Rochester shale.

The flat bedrock-exposed surface of the dolomite immediately above the quarry is an example of dolomite pavement (EEAC 1978). Although common in the Bruce Peninsula, it is rare in Halton due to the presence of deep glacial deposits. Joints in the bedrock separate large blocks of flat dolomite near the edge of the escarpment. The appearance is similar to a paved area, and hence the term. Representation would include both Pleistocene erosion (exposing the bedrock surface) and Recent karst and mass wasting processes (enlarging of joints between the blocks). The significance of this feature has not been rated. The Waterdown Moraine (Pleistocene) lies immediately above the escarpment. A small portion of the moraine is included in the northernmost portion of the ESA. This end moraine marks the furthest extent of the ice front following the re-advance which deposited the Halton Till (Karrow 1987a).

**8) Areas that are determined to contribute significantly to local and/or regional groundwater recharge.**

Although the regional significance of this ESA has not been formally evaluated, its shallow soils and fractured bedrock surface covering a relatively large area would suggest the potential for significant groundwater recharge (Cowell, pers. obs. 1992).

**9) Areas that are determined to be significant groundwater discharge areas.**

Many small streams which drain directly into Hamilton Harbour originate at the base of the escarpment below this ESA. Although the significance of the groundwater discharge from this ESA has not been quantitatively determined, these small streams would receive at least a portion of their flow from springs along the face of the escarpment (Ecologistics 1977).

**10) Areas that contribute significantly to groundwater quality.**

The natural vegetation of the ESA and lack of significant pollutant sources within or near the ESA help maintain high recharge water quality. The bedrock aquifer contributes calcium and magnesium to the water, which increases water hardness but does not degrade water quality.

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The groundwater flow contributes to numerous streams which drain into Hamilton Harbour. Water quality in the harbour has been severely degraded due to industrialization and urbanization of the watershed. Efforts are now in place to improve the harbour's water quality, therefore natural areas which contribute groundwater to these streams are very important to the maintenance of high water quality in both the streams and the harbour.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Hybrid Soft Maple (*Acer x freemanii*)  
Hairy Rock Cress (*Arabis hirsuta* ssp. *pycnocarpa*)  
Heath Aster (*Aster ericoides*)  
Arrow-Leaved aster (*Aster urophyllus*)

Aster (*Aster x amethystinus*)  
Smooth False Foxglove (*Aureolaria flava*)  
Harebell (*Campanula rotundifolia*)  
Slender Sedge (*Carex gracilescens*)  
Sedge (*Carex grayi*)  
Sedge (*Carex normalis*)  
Sedge (*Carex prasina*)  
Sedge (*Carex rugosperma*)  
Pignut Hickory (*Carya glabra*)  
Hackberry (*Celtis occidentalis*)  
Purple Clematis (*Clematis occidentalis* var. *occidentalis*)  
Hawthorn (*Crataegus scabrida*)  
Large-bracted Tick-trefoil (*Desmodium cuspidatum* var. *cuspidatum*)  
Tick-trefoil (*Desmodium paniculatum* var. *paniculatum*)  
Few-flowered Spike-rush (*Eleocharis pauciflora*)  
Variegated Horsetail (*Equisetum variegatum*)  
Robins Plantain (*Erigeron pulchellus*)  
Burning Bush (*Euonymus atropurpurea*)  
Eastern Red Cedar (*Juniperus virginiana*)  
Intermediate Pinweed (*Lechea intermedia*)  
Hairy Bush-clover (*Lespedeza hirta*)  
Bush-Clover (*Lespedeza intermedia*)  
Wild Crabapple (*Malus coronaria*)  
One-flowered Pyrola (*Moneses uniflora*)  
Red Mulberry (*Morus rubra*)  
Pellitory (*Parietaria pennsylvanica*)  
False Dragonhead (*Physostegia virginiana*)  
Smartweed (*Polygonum punctatum*)  
Fragrant Sumac (*Rhus aromatica*)  
Skunk Currant (*Ribes glandulosum*)  
Black Willow (*Salix nigra*)  
Sassafras (*Sassafras albidum*)  
Rue-anemone (*Thalictrum thalictroides*)  
Summer Grape (*Vitis aestivalis*)

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The majestic height of the escarpment provides many panoramic views of the lands below. This spectacular scenery seen from the many vantage points along the escarpment gives the area high aesthetic value.

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 5

- 15) **The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

This property has been used by Boy Scout groups for field trips (Axon pers. comm. 1992-93).

### **Sources of Information**

Armour, E. et al. 1979.  
Axon, B.K. 1989b.  
Brobst, B.K. 1983a.  
Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
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Gould, J. 1989.  
Heagy, A.E. (ed.). 1993. (study area extends slightly beyond ESA)  
Kaiser, J. 1984.  
Karrow, P.F. 1987a.  
Landplan Collaborative Ltd. (undated, ca.1987.)  
Ontario Ministry of Natural Resources. 1976a, 1983a, 1991a, 1991b, 1994.  
Regional Municipality of Halton. 1978, 1982.  
Riley et al. 1996  
Royal Botanical Gardens. 1977, 1981.  
Sutherland, D. 1981.



## **ESA 6: Nelson Escarpment Woods**

### **General Description**

The Nelson Escarpment Woods span a series of valleys and ridges on the edge of the Escarpment. The predominant earth science feature of this ESA is the Niagara Escarpment. The Escarpment landform has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, and hence, this ESA is part of an internationally significant landform. Although the formation of the escarpment pre-dates the last glaciation, its present morphology is predominantly due to erosion during the Wisconsin glaciation (Pleistocene). The morphology of the escarpment at this location is representative of a mantled scarp where the vertical scarp face is largely absent and covered in glacial deposits.

The glacial material includes a blanket of Halton Till (Pleistocene) and a portion of the Waterdown Moraine (Pleistocene), the latter identified as a regionally significant earth science ANSI by the OMNR (1983a). The moraine occurs above the escarpment in the central portion of the ESA in the vicinity of Fisher's Pond. This end moraine marks the furthest extent of the ice front following the re-advance which deposited the Halton Till (Karrow 1987a).

This ESA includes forest features associated with the Niagara Escarpment and includes dramatic topography along its base. Sugar maple and American beech are the dominant forest cover species, although there are also scattered conifers. There are several small ponds in the eastern part, one of which supports a marsh and wet meadow community.

The east portion (Nelson Slope Forest) has been identified by OMNR as a regionally significant Life Science ANSI (OMNR 1991b).

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 6

Size:	221 hectares
Plant Species (total #):	189*
Plant communities:	Meadow Marsh (3.2) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-American Beech Forest (4.1.2.17) Late Successional Old Field (6.1.0.1) Conifer Plantation (7.3.1) Hardwood Plantation (7.3.2)
Animal Species:	Herptiles: 8 Birds: 3 (B), 31 (P), 11 (O) Mammals: 3 Fish: 2
Earth Science Features:	Escarpment Moraine
Other Designations:	UNESCO MAB Reserve Regionally Significant Life Science ANSI Regionally Significant Earth Science ANSI Parkway Belt West Area Niagara Escarpment Plan Area
Ownership:	Private

\* Total number of plant species does not currently correspond with database

### Criteria Fulfilled

#### Primary Criteria

#### 6) Areas that contain plant and/or animal species that are rare provincially or nationally.

The following nationally and provincially rare species has been identified within this ESA:

Hawthorn (*Crataegus scabrída*)  
Five-lined Skink (*Eumeces fasciatus*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. In the Nelson Escarpment Woods, the escarpment face is exposed in only a few areas as most sections are mantled (buried scarp) in glacial till. Excellent representation of the Halton Till and the Waterdown Moraine also occur in this ESA.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Hawthorn (*Crataegus macrosperma*)  
Hawthorn (*Crataegus scabrada*)  
Hawthorn (*Crataegus succulenta*)  
Clammy Ground-cherry (*Physalis heterophylla*)  
Bristly Crowfoot (*Ranunculus pensylvanicus*)  
Dotted Water-meal (*Wolffia borealis*)

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

There are several excellent scenic lookouts facing Lake Ontario along the Escarpment. In addition, the maturity of the woodlands and the presence of beautiful features such as the large pond give the area a high aesthetic value.

**Sources of Information**

Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Gould, J. 1989.  
Jakab, S., L. Densmore, and S. Warren. 1980.  
Kaiser, J. 1984.  
Karrow, P. 1987a.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1988, 1991b.  
Regional Municipality of Halton. 1978, 1982.  
Riley et al. 1996  
Royal Botanical Gardens. 1977, 1981.

## **ESA 7: Lake Medad and Medad Valley**

### **General Description**

Lake Medad and its associated bedrock-controlled valley form part of a major spillway which drained the front of the Late Wisconsin glacier (OMNR 1976a, Karrow 1987a). The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. The valley was cut into bedrock and carried meltwater to the north where it drained into the Lowville re-entrant valley. The predominant features of this ESA include a bedrock channel (Pleistocene), partially filled with glaciofluvial meltwater sands and gravels (Pleistocene), with overlying organic deposits (Recent).

The valley lies between two of the main Waterdown Moraine crests and likely functioned as a spillway following the construction of the youngest moraine crest which is located along the brow of the escarpment.

Lake Medad has a water depth of 5.2 m (Karrow 1987a) and is located within the bedrock channel. This indicates strong localized erosion by glacial meltwater (Pleistocene) enhanced by the presence of large boulders. The Lake Medad and associated spillway channel has been designated as a regionally significant Earth Science ANSI (OMNR 1976a, 1983a). Marl (soft calcium carbonate) and black organic ooze occur in the deepest portion of the lake (Karrow 1987a).

A large variety of flora and fauna is found in this heavily forested valley which has been identified as one of the top botanical sites within the Region (Varga and Allen 1990). The Medad Valley is wet and lush with small creeks draining to the north into Bronte Creek, and swamplands draining slowly to the south into Lake Medad. The wetland area (213 hectares) is a provincially significant wetland complex which extends into Hamilton Wentworth Region. This site is a provincially significant Life Science ANSI.

The west uplands support deciduous forests of maple, oak, beech and cherry, while the valley floor is a mixed swamp of eastern white cedar, white birch, tamarack, maple and hemlock. Along the north margin of the lake is a cattail marsh which extends northward into the valley basin.

The major impact on the area appears to be a pipeline which disturbed much of the forest, resulting in erosion of slopes (EEAC 1978). Heavy recreational use in both the northern and southern parts of the ESA, including camp sites, evidence of motorcycles and a golf course is reported (EEAC 1978). A housing development is located along the brow of the valley on the east side. The area was surveyed by the Niagara Escarpment Commission and judged to be a regionally significant asset (Cowell and Woerns 1977).

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 7

Size:	261 hectares
Plant Species (total #):	383*
Plant communities:	Cattail Marsh (3.1.1.1) Tamarack Swamp (3.6.2.1) Southern White Cedar Swamp (3.6.2.2) Sugar Maple-American Beech Forest (4.1.2.17)
Animal Species:	Herptiles: 16 Birds: 21(B), 45 (P), 18(O) Mammals: 7 Fish: 13
Earth Science Features:	Marl Deposits Meltwater Channel
Other Designations:	UNESCO MAB Reserve Provincially Significant Life Science ANSI Regionally Significant Earth Science ANSI Provincially Significant Wetland Complex Niagara Escarpment Plan Area
Ownership:	Private

\* Total number of plant species does not currently correspond with database

### Criteria Fulfilled

#### Primary Criteria

- 1) Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

A total of 333 native plant species have been reported from this ESA which ranks sixth among Halton's ESAs with respect to plant species richness.

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

This ESA contains the following nationally and provincially rare species:

Atlantic Salmon (*Salmo salar*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The Lake Medad and associated spillway channel has been rated as a regionally significant Earth Science ANSI (OMNR 1976b, 1983a). The location of Lake Medad within a bedrock channel suggests deep erosion by glacial meltwater (Pleistocene) rather than kame and kettle formation as previously described. Within four of the six metres of mud/marl sediment in the bottom of the lake, there exists 10,000 years of pollen records (Karrow 1987a). This area is also representative of the internationally significant Niagara Escarpment, which has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

**9) Areas that are determined to be significant groundwater discharge areas.**

Significant discharge occurs in a tributary of Bronte Creek within this ESA which contributes to maintaining water quality. As well, significant wetland storage is found in the Medad Valley (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

Water quality in Bronte Creek is enhanced by water storage in the valley bottomlands and wetland in this ESA (Ecologistics 1977).

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Sheathed Sedge (*Carex vaginata*)  
Purple Avens (*Geum rivale*)  
Pale-leaved Sunflower (*Helianthus strumosus*)  
Bog Laurel (*Kalmia polifolia*)  
Swamp Loosestrife (*Lysimachia terrestris*)  
Sweet Gale (*Myrica gale*)  
Sweet Coltsfoot (*Petasites frigidus*)  
Bluegrass (*Poa alsodes*)  
Green-flowered Pyrola (*Pyrola chlorantha*)  
Late Goldenrod (*Solidago gigantea*)  
Common Bur-reed (*Sparganium eurycarpum*)  
Hardhack (*Spiraea tomentosa*)

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 7

Skunk Cabbage (*Symplocarpus foetidus*)  
Smooth White Violet (*Viola macloskeyi*)

### **13) Areas that contain high quality assemblages of native plant and/or animal species.**

The forests of the area are generally of good quality and include some individual specimens of unusual proportions. Sections of the upland broadleaf forest in the north and southeast are of notable quality and the wetlands of the valley basin are particularly lush, supporting communities of mature tamarack (*Larix laricina*) and large, healthy populations of showy ladies' slipper (*Cypripedium reginae*)(EEAC 1978). This area has been identified as one of the top botanical sites in the Region (Varga and Allen 1990).

### **Sources of Information**

Axon, B. K. and S. Newton-Harrison. 1987.  
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Crins, W.J. 1986.  
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Ecologistics Ltd. 1977.  
Heagy, A.E. (ed.). 1993. (study area extends slightly beyond ESA)  
Kaiser, J. 1984.  
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Ontario Ministry of Natural Resources. 1976a, 1976b, 1983a, 1991b.  
Regional Municipality of Halton. 1978, 1982.  
Riley et al. 1996  
Royal Botanical Gardens. 1977, 1981.  
Varga, S. and G.M. Allen. 1990.

## **ESA 8: Mount Nemo Escarpment Woods**

### **General Description**

The predominant earth science feature of this ESA is the Niagara Escarpment. The Escarpment landform has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. The area has also been designated a provincially significant earth science ANSI due to its excellent representation of a major promontory and the bedrock components of a portion of the Niagara Escarpment (Kor 1991). Although the formation of the escarpment pre-dates the last glaciation, its present morphology is predominantly due to erosion during the Wisconsin glaciation (Pleistocene). Halton Till (Pleistocene) mantles the ESA above and below the scarp face and a small portion of the Waterdown Moraine (Pleistocene) lies above the escarpment west and south of the old quarry.

The high cliffs provide excellent exposures of Amabel Formation dolomite (Silurian). At the top of the cliffs, large blocks of dolomite have shifted forward on the weaker shales forming long and deep 'crevice caves' (Recent landform). The caves occupy open joint planes. Together, these earth science features in this area have been rated as a provincially significant Earth Science ANSI (OMNR 1976a, 1983a). Crevice caves are generally more common outside the Region of Halton in Bruce and Grey Counties where the Amabel bluffs are especially well displayed.

Several of the deepest crevice caves have cave formations such as flowstone and cave coral, however, these have been damaged due to the high volume of hikers and climbers in this area.

The vegetation communities on the rim and foot slopes are varied in ages, but locally are intermediate to mature and are essentially continuous. The exposure of the cliff face and talus varies from northwest to east. There is a well-defined gradient of vegetation communities that changes along this exposure in response to microclimate effects. Those communities on the talus in the northern half are well-developed and the area is one of the top botanical sites within the Region (Varga and Allen 1990). The old growth cedar forest at this site is ecologically significant (Larson pers. Comm., 1993). The ESA includes the locally significant Mount Nemo wetland complex. The area has been designated a provincially significant Life Science ANSI (Riley et al. 1996).

The proximity to urban centres and the scenic value hold considerable lure for increased housing development. This ESA is 65% owned by the Halton Region Conservation Authority.



# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 8

Size:	258 hectares
Plant Species (total #):	354
Plant Communities*:	Eastern White Cedar (4.1.1.1) Butternut-American Basswood Forest (4.1.2.14) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-American Beech Forest (4.1.2.17) Early Successional-Southern Mixed Hardwood Forest (4.1.2.27) Warm Dry Alkaline Escarpment/Cliff (4.7.3.3) Late Successional Old Field (6.1.0.1) Cultivated Field
Animal Species:	Herptiles: 14 Birds: 19(B), 48(P), 6(O) Mammals: 15
Earth Science Features:	Flowstone Crevice Caves, Fissures Moraine
Other Designations:	UNESCO MAB Reserve Provincially Significant Life Science ANSI Provincially Significant Earth Science ANSI Locally Significant Wetland Complex Niagara Escarpment Plan Area
Ownership:	Public 65%, Private 35%.

### Criteria Fulfilled

#### Primary Criteria

**3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

Varga et al. (1994a), have identified 44 plant communities in a Life Science ANSI report. Although some of these will be combined when the Kavanagh and McKay-Kuja (1992) classification is applied, the number of plant communities is expected to be high in the context of Halton Region.

**5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

The old growth cedar community on the escarpment is rare (Larson pers. comm. 1993).

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

This ESA contains the following nationally and provincially rare plant species:

Harts-tongue Fern (*Asplenium scolopendrium* var. *americanum*)  
American Chestnut (*Castanea dentata*)  
Hypnum Moss (*Platydictya confervoides*)  
Languid Spear Grass (*Poa languida*)  
Neckera Moss (*Thamnobryum alleghaniense*)

This ESA contains the following nationally and provincially rare animal species:

Northern Long-eared Bat (*Myotis septentrionalis*)  
Eastern Pipistrelle (*Pipistrellus subflavus*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The high cliffs provide excellent exposures of the Amabel Formation (Silurian). At the top of the cliffs, large blocks of dolomite have shifted forward on the weaker shales, forming long and deep crevice caves. The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. The area has also been designated a provincially significant earth science ANSI due to its excellent representation of a major promontory and the bedrock components of a portion of the Niagara Escarpment (Kor 1991).

**9) Areas that are determined to be significant groundwater discharge areas.**

Major groundwater discharges exist at the base of the Escarpment, with major contributions of surface water to Bronte Creek as well as regional groundwater discharge to Lake Ontario (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

Groundwater flow contributes to numerous springs which feed the headwaters of Bronte Creek. The high quality of this discharge is important for maintaining good surface water quality in Bronte Creek. In addition, the groundwater discharge is relatively cold during the summer period, enhancing the potential for coldwater fish habitat.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Hairy Rock Cress (*Arabis hirsuta* ssp. *pycnocarpa*)  
Harts-tongue Fern (*Asplenium scolopendrium* var. *americanum*)  
Canada Milkvetch (*Astragalus canadensis*)  
Sedge (*Carex prasina*)  
Sedge (*Carex sprengelii*)  
American Chestnut (*Castanea dentata*)  
Hackberry (*Celtis occidentalis*)  
Leatherleaf (*Chamaedaphne calyculata*)  
Purple Clematis (*Clematis occidentalis*)  
Golden Corydalis (*Corydalis aurea* ssp. *aurea*)  
Round-leaved Hawthorn (*Crataegus chrysocarpa*)  
Hawthorn (*Crataegus succulenta*)  
Small Bedstraw (*Galium trifidum*)  
Rock Sandwort (*Minuartia michauxii*)  
Spring Clearweed (*Pilea fontana*)  
Bluegrass (*Poa alsodes*)

**13) Areas that contain high quantity assemblages of native plant and/or animal species.**

This area contains a high quality botanical resource, as it has been designated one of the top botanical sites within the Region of Halton (Varga and Allen 1990).

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The high exposed cliff affords many spectacular viewpoints over the valley lands to the north and east over the Peel Plain towards Rattlesnake Point (EEAC 1978).

- 15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The proximity to urban centres, together with its geologic features make it a suitable area for research and education. The area is used by the Halton Conservation Authority for their outdoor education programs. The ESA is especially valuable for research because of the old growth cedars (>700 yrs, Larson pers. comm. 1993) and endolithic cryptograms present on the site.

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## **ESA 9: Lowville-Bronte Creek Escarpment Valley**

### **General Description**

This ESA occupies a large portion of the Lowville re-entrant valley which received tremendous quantities of meltwater from spillways and meltwater systems located to the north and south. The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. The largest expanse of outwash gravel deposits (Pleistocene) of any of the ESAs occurs here. These gravels were deposited over a wide area as the meltwaters dispersed from their associated spillway channels. Also included within this ESA is a small glaciofluvial kame deposit (Pleistocene) located on the boundary with Hamilton-Wentworth. This formed prior to the outwash being deposited and is partially buried in the outwash. The downstream portion of the ESA is mantled in Halton Till (Pleistocene) and partially overlain with alluvium (Recent) deposited in the floodplain of Bronte Creek. This ESA has been designated as a provincially significant earth science ANSI, Lowville Re-entrant Valley.

Bronte Creek is a major waterway, fast moving and cool, providing habitat for populations of game fish and adding greatly to the aesthetic value of the area. The valley walls are densely vegetated with good quality broadleaf and mixed forests, and the area has been designated a provincially significant life science ANSI (Bronte Creek Escarpment Valley) by the OMNR (Gould 1985b). A second provincially significant life science ANSI has also been designated within the ESA (Bronte Creek Escarpment Valley), it provides an example of an incised escarpment reentrant valley with well developed vegetation patterns on the valley slopes and floodplains (Klinkenberg 1984). The ESA includes a locally significant wetland complex, Cedar Springs Swamp. It is held in private ownership and is four hectares in size. Two quarries are located in the area. The one on the east side of Kilbride is closed and the one on the west side of Kilbride is the subject of a Niagara Escarpment Plan Amendment to change the designation from "Mineral Extraction" to "Rural" (Niagara Escarpment Commission 1993).

# HALTON REGION Environmentally Sensitive Areas Update

ESA N° 9

Size:	373 hectares
Plant Species (total #):	295
Plant communities:	<p>Cattail Marsh (3.1.1.1)            Forb-Rich Wet Meadow (3.2.0.4)            Eastern Hemlock Swamp (3.6.2.6)            Crack Willow-Maple-Elm Swamp (3.6.3.15)            Rich Black Maple-Mixed Hardwood (4.1.2.12)            Sugar Maple-American Beech Forest (4.1.2.17)            Sugar Maple-Mixed Oak Forest (4.1.2.18)            Large Tooth Aspen Successional Forest (4.1.2.28)            Eastern Hemlock-Mixed Hardwood Forest (4.1.3.3)            Sumac Thicket (4.2.0.1)            Hawthorn Thicket (4.2.0.4)            Late Successional Old Field (6.1.0.1)            Old Orchard (7.2)            Conifer Plantation (7.3.1)            Cultivated Field</p>
Animal Species:	<p>Herptiles: 5            Birds: 32(B), 24(P), 11(O)            Mammals: 12            Fish: 20            Insects: 1</p>
Earth Science Features:	<p>Escarpment            Outwash Plain            Kame            Incised Valley</p>
Other Designations:	<p>UNESCO MAB Reserve            2 Provincially Significant Life Science ANSIs            Provincially Significant Earth Science ANSI            Locally Significant Wetland Complex            Niagara Escarpment Plan Area</p>
Ownership:	Private

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 9

### Criteria Fulfilled

#### Primary Criteria

- 3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

A relatively large number of native plant communities (12) have been identified in this ESA in the context of Halton Region.

- 5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

The rich black maple-mixed hardwood community is an uncommon community in Halton.

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

This ESA contains the following provincially and nationally significant animal species:

Louisiana waterthrush (*Seiurus motacilla*)  
Wood Turtle (*Clemmys insculpta*)  
West Virginia White (*Pieris virginiensis*)  
American Brook Lamprey (*Lampetra appendix*)  
Silver Shiner (*Notropis photogenis*)  
Atlantic Salmon (*Salmo salar*)

- 7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The largest expanse of outwash gravel deposits (Pleistocene) of any of the ESAs occurs here. Also included in this ESA is a small glaciofluvial kame deposit located on the boundary with Hamilton-Wentworth. The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

- 9) Areas that are determined to be significant groundwater discharge areas.**

Major groundwater discharge occurs into Bronte Creek from north and south. Well water data show piezometric gradients sloping into this bedrock valley. Significant bedrock and shallow over-burden aquifers exist (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The well-wooded creek maintains high quality surface waters. Also the groundwater discharge into this section of the creek may be considerable as this section maintains coldwater conditions (Heagy, A.E. (ed.) 1993).

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Groundnut (*Apios americana*)  
Ebony Spleenwort (*Asplenium platyneuron*)  
Sedge (*Carex prasina*)  
Sedge (*Carex sprengelii*)  
Spotted Coral-root (*Corallorhiza maculata*)  
Hay-scented Fern (*Dennstaedtia punctilobula*)  
River Bank Wild-rye (*Elymus riparius*)  
Smooth Scouring Rush (*Equisetum laevigatum*)  
Meadow Horsetail (*Equisetum pratense*)  
Woodland Horsetail (*Equisetum sylvaticum*)  
Variegated Horsetail (*Equisetum variegatum*)  
Running Club-moss (*Lycopodium clavatum*)  
Wild Crabapple (*Malus coronaria*)  
Smooth Sweet-cicely (*Osmorhiza longistylis*)  
Pokeweed (*Phytolacca americana*)  
Bluegrass (*Poa alsodes*)  
Pondweed (*Potamogeton natans*)  
Black Willow (*Salix nigra*)  
New York Fern (*Thelypteris noveboracensis*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

The area includes a cold water stream and associated riparian communities which are of high quality.



- 15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The Halton Region School Board uses the area in its conservation and outdoor education programs. Fishing clubs monitor fish spawning regularly (Axon pers.comm. 1992-93).

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## **ESA 10 Bronte Creek Valley**

### **General Description**

Bronte Creek Valley is a deeply incised valley cut into the Queenston shale. In the vicinity of Highway 5, it is a steep-walled gorge more than 30 m deep (Karrow 1987a). The gradient of Bronte Creek below Zimmerman averages 5.7 m/km and the mouth of the creek is partially drowned by the rising waters of Lake Ontario (Karrow 1987a). The Zimmerman Valley has been designated a regionally significant life science ANSI because it is a good representation of the Ontario-Peel plain valley (Gould 1989). The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, a portion of this ESA is part of an internationally significant landform.

Bronte Creek Valley has been rated as a provincially significant earth science ANSI (Halton Till) due to its wide range and complexity of landforms and outcrops (OMNR 1983b). Its significance is attributed to exposures of Queenston shale (Ordovician), a buried bedrock valley (Pleistocene) located immediately upstream of the QEW, Halton Till (Pleistocene), localized sandy nearshore deposits of glacial Lake Iroquois (Pleistocene), and an 80 ft long cave formed in cemented gravels (Recent). Tablelands included within the uppermost portion of the ESA have surficial materials which were deposited during the Peel Ponding (Pleistocene). On the table land at the upstream end of the ESA is a small area covered by silts and clays deposited during the Peel Ponding (Pleistocene). Lake Peel was formed by meltwater trapped between the ice (located at the Trafalgar Moraine) and the escarpment. It was a relatively short-lived lake but is represented by clay/silt varve deposits up to 1.3 m in thickness (Karrow 1987a).

The stream is one of the major streams in which Lake Ontario salmonids spawn (EEAC 1978). There is a well-developed cattail marsh near the mouth and both plant and animal communities are extremely varied and of excellent quality (EEAC 1978) (Varga and Allen 1990). The six hectare marsh is privately owned and designated as a locally significant wetland complex. Bronte Creek has the highest quality water of any major stream in the southern half of the Region. Every effort should be made to ensure that the water quality and biological integrity of this system are kept relatively undisturbed and intact (EEAC 1978). The site is recognized as a provincially significant Life Science ANSI, Bronte Creek Provincial Park Nature Reserve Zone (OMNR 1991a), on the basis of its outstanding diversity and relative lack of disturbance. It has the highest plant species richness (647 species) of Halton's ESAs.

Since Bronte Creek is a generally north-south feature, it interrupts east-west utilities and transportation facilities. There is a need to ensure that the recreational use of Bronte Creek Provincial Park does not adversely impact those plant communities which are

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 10

sensitive to heavy use. Soil extraction operations and a brick company on the rim and west bank of the river just north of Highway 5 have had an impact on the area, however, recent rehabilitation planting and other work should remedy the situation (Axon pers. comm., 1992-93). The future of storm run-off from developments and roads to the east and west should not be allowed to enter the Creek directly and mitigation of storm water flows should be considered (see Taylor 1992).

Size:	480 hectares
Plant Species (total #):	647
Plant communities:	Cattail Marsh (3.1.1.1) Willow Forest (4.1.2.1) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-American Beech Forest (4.1.2.17) Sugar Maple-Mixed Oak (4.1.2.18) Mixed Oak Forest (4.1.2.24) Large Tooth Aspen Successional Forest (4.1.2.28) Sugar Maple-Red Maple Forest (4.1.2.34) Eastern Hemlock-Mixed Hardwood Forest (4.1.3.3) Eastern White Cedar-Hemlock-Mixed Hardwood Forest (4.1.3.8) Sumac Thicket (4.2.0.1) Hawthorn Thicket (4.2.0.4) Mesic Prairie (4.4.2.1) Late Successional Old Field (6.1.0.1)
Animal Species:	Herptiles: 26 Birds: 66(B), 2(P), 101(O) Mammals: 17 Fish: 45 Insects: 120
Earth Science Features:	Incised Valley Peel Ponding Buried Valley
Other Designations:	UNESCO MAB Reserve Provincially and Regionally Significant Life Science ANSI Provincially Significant Earth Science ANSI Locally Significant Wetland Complex Parkway Belt West Area Niagara Escarpment Plan Area
Ownership:	Private & Public (Bronte Creek Provincial Park)

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 10

### Criteria Fulfilled

#### Primary Criteria

- 1) Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

This ESA has the second highest native vascular plant species richness of Halton's ESAs (674). An unusually large diversity of herptiles (26 species) has been reported. A total of 17 mammal species have been sighted and the creek supports at least 40 species of fish (McIlrick pers. comm. 1994).

- 2) Areas that provide functional links among two or more adjacent natural systems.**

This ESA provides a link in migratory routes for waterfowl and raptors. It provides a north-south route linking the shoreline of Lake Ontario to the Escarpment woodlands, accounting for the large number of bird species sighted in this area. Bronte Creek is a migratory route for coho and chinook salmon (*Onchorhynchus kitsutch* and *O. tshawytscha*) and rainbow trout (*Salmo gairdneri*), and the system is a spawning area for small-mouth bass (*Micropterus dolomieu*) (EEAC 1978).

- 3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

Fourteen separate native plant communities have been delineated on the basis of the Life Science ANSI survey of Bronte Creek Provincial Park (House and Carleton 1988).

- 5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

The remnant prairie community on the Hydro Right-of-Way is unusual in Halton Region and significant in southern Ontario (House and Carleton 1988)(OMNR 1993).

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following nationally or provincially rare plant species have been found in this ESA:

Slender Sedge (*Carex gracilescens*)

Hawthorn (*Crataegus conspecta*)

Red-rooted Cyperus (*Cyperus erythrorhizos*)

Large-bracted Tick-trefoil (*Desmodium cuspidatum* var. *cuspidatum*)

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Wild Yellow Flax (*Linum virginianum*)  
Hoary Puccoon (*Lithospermum canescens*)  
Woodland Satin Grass (*Muhlenbergia sylvatica*)  
Slender Satin Grass (*Muhlenbergia tenuiflora* var. *tenuiflora*)  
Ginseng (*Panax quinquefolius*)  
Hispid Buttercup (*Ranunculus hispidus* var. *hispidus*)  
Sharp-leaved Goldenrod (*Solidago arguta* var. *arguta*)

The following nationally or provincially rare animal species have been found in this ESA:

Red-headed Woodpecker (*Melanerpes erythrocephalus*)  
Wood Turtle (*Clemmys insculpta*)  
Eastern Hognose Snake (*Heterodon platirhinos*)  
Sleepy Duskywing (*Erynnis brizo*)  
Common Sootywing (*Pholisora catullus*)  
Monarch (*Danaus plexippus*)  
Redside Dace (*Clinostomus elongatus*)  
Striped Shiner (*Notropis chrysocephalus*)  
Silver Lamprey (*Ichthyomyzon unicuspis*)  
Silver Shiner (*Notropis photogenis*)  
Atlantic Salmon (*Salmo salar*)

### **7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The earth science significance of this ESA relates to the extensive exposures of Queenston shale (Ordovician), a buried bedrock valley (Pleistocene), localized sandy nearshore deposits of glacial Lake Iroquois (Pleistocene), the Peel Ponding deposits, and Mackenzie's cave (Recent). The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, a portion of this ESA is part of an internationally significant landform.

The buried valley has been designated as provincially significant. MacKenzie's cave is formed from a combination of fluvial and karst processes (although not in the conventional sense of karst caves which are formed in soluble bedrock).

### **9) Areas that are determined to be significant groundwater discharge areas.**

Twelve Mile Creek serves as a major discharge zone, with flow lines indicating a major contribution from groundwater from the north and east (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The stream banks are well-forested and the creek flows through a broad floodplain and cattail marsh, which serves to maintain high water quality.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Sweet-flag (*Acorus americanus*)  
Giant Ragweed (*Ambrosia trifida*)  
Serviceberry (*Amelanchier alnifolia*)  
Big Bluestem (*Andropogon gerardii*)  
Groundnut (*Apios americana*)  
Tower Mustard (*Arabis glabra*)  
Hairy Rock Cress (*Arabis hirsuta* ssp. *pycnocarpa*)  
Bearberry (*Arctostaphylos uva-ursi*)  
Butterfly-weed (*Asclepias tuberosus*)  
Heath Aster (*Aster ericoides*)  
Sky-blue Aster (*Aster oolentangiensis*)  
Arrow-leaved Aster (*Aster urophyllus*)  
Long-awned Wood Grass (*Brachyelytrum erectum*)  
Ear-leaved Brome (*Bromus latiglumis*)  
Low Bindweed (*Calystegia spithamea*)  
Tall Bellflower (*Campanula americana*)  
Cuckoo-flower (*Cardamine pratensis*)  
Slender Sedge (*Carex gracilescens*)  
Sedge (*Carex grayi*)  
Narrow-leaved Sedge (*Carex grisea*)  
Sedge (*Carex lucorum*)  
Sedge (*Carex rugosperma*)  
Sedge (*Carex scoparia*)  
Hornwort (*Ceratophyllum demersum*)  
Spotted Coral-root (*Corallorhiza maculata*)  
Round-leaved Hawthorn (*Crataegus chrysocarpa*)  
Hawthorn (*Crataegus conspecta*)  
Hawthorn (*Crataegus succulenta*)  
Umbrella Sedge (*Cyperus bipartitus*)  
Umbrella Sedge (*Cyperus strigosus*)  
Common Hairgrass (*Deschampsia flexuosa*)

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## Environmentally Sensitive Areas Update

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ESA N° 10

Large-Bracted Tick-Trefoil (*Desmodium cuspidatum* var. *cuspidatum*)  
Dutchmans Breeches (*Dicentra cucullaria*)  
Matted Spike-Rush (*Eleocharis intermedia*)  
River Bank Wild-Rye (*Elymus riparius*)  
Slender Wheat Grass (*Elymus trachycaulus*)  
Fireweed (*Epilobium angustifolium*)  
Woodland Horsetail (*Equisetum sylvaticum*)  
Stiff Marsh Bedstraw (*Galium tinctorium*)  
Purple Avens (*Geum rivale*)  
Rattlesnake Manna Grass (*Glyceria canadensis*)  
Common Sneezeweed (*Helenium autumnale*)  
Cow-Parsnip (*Heracleum lanatum*)  
Rough Hawkweed (*Hieracium scabrum*)  
Eastern Red Cedar (*Juniperus virginiana*)  
Canada Lettuce (*Lactuca canadensis*)  
Intermediate Pinweed (*Lechea intermedia*)  
Hairy Bush-Clover (*Lespedeza hirta*)  
Bush-Clover (*Lespedeza intermedia*)  
Wood Lily (*Lilium philadelphicum*)  
False Pimpernel (*Lindernia dubia*)  
Wild Yellow Flax (*Linum virginianum*)  
Hoary Puccoon (*Lithospermum canescens*)  
Wild Crabapple (*Malus coronaria*)  
Common Satin Grass (*Muhlenbergia frondosa*)  
Woodland Satin Grass (*Muhlenbergia sylvatica*)  
Slender Satin Grass (*Muhlenbergia tenuiflora* var. *tenuiflora*)  
Cancer-root (*Orobancha uniflora*)  
Smooth Sweet-cicely (*Osmorhiza longistylis*)  
Slender-leaved Panic Grass (*Panicum linearifolium*)  
Sycamore (*Platanus occidentalis*)  
Whorled Milkwort (*Polygala verticillata*)  
Smartweed (*Polygonum achoreum*)  
Bigseed Smartweed (*Polygonum pensylvanicum*)  
Jumpseed (*Polygonum virginianum*)  
Clasping-leaved Potamogeton (*Potamogeton perfoliatus*)  
Chinquapin Oak (*Quercus muhlenbergii*)  
Hispid Buttercup (*Ranunculus hispidus* var. *hispidus*)  
Bristly Crowfoot (*Ranunculus pensylvanicus*)  
Prickly Rose (*Rosa acicularis* ssp. *sayi*)  
Swamp Rose (*Rosa palustris*)  
Northern Dewberry (*Rubus flagellaris*)  
Black Willow (*Salix nigra*)  
Sassafras (*Sassafras albidum*)

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## Environmentally Sensitive Areas Update

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ESA N° 10

Little Bluestem (*Schizachyrium scoparium*)  
Sharp-leaved Goldenrod (*Solidago arguta* var. *arguta*)  
Late Goldenrod (*Solidago gigantea*)  
White Goldenrod (*Solidago hispida*)  
Nuttalls Bur-reed (*Sparganium americanum*)  
New York Fern (*Thelypteris noveboracensis*)  
Southern Arrow-wood (*Viburnum recognitum*)  
Arrow-leaved Violet (*Viola sagittata*)  
Northern Blue Violet (*Viola septentrionalis*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

Plant and animal communities are extremely varied, fairly mature, and are of excellent quality (EEAC 1978). Varga and Allen (1990) have also identified part of this area (Bronte Creek Provincial Park) as one of the top botanical sites within the Region.

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The views from the top of valley and road crossing are impressive, particularly during the fall.

**15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

Much of this ESA is used for conservation education purposes by Bronte Provincial Park staff. A scout camp is located at the north end of the ESA (EEAC 1978).

### **Sources of Information**

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# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 10

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Royal Botanical Gardens. 1977, 1981.  
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# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 12

### ESA 12: Fourteen Mile Creek Valley

#### General Description

The Fourteen Mile Creek Valley contains a floodplain with wet meadows, hillsides with mature mixed forests and a strip of adjacent tableland. The floodplain is accentuated with large, vigorously growing willows and hawthorns (EEAC 1978).

The area is an important migratory staging and wintering area for saw-whet owl (*Aegolius acadicus*) and long-eared owl (*Asio otus*). Species which breed in the area include red-tailed hawk (*Buteo jamaicensis*), great horned owl (*Bubo virginianus*), red fox (*Vulpes vulpes*), white-tailed deer (*Odocoileus virginianus*) (EEAC 1978) and long-eared owl (M.J. Sharp pers. obs. 1982). The Town of Oakville is developing a trail along the eastern rim of ESA 12 and there is a golf course located to the west.

Size:	68 hectares
Plant Species (total #):	256
Plant communities:	Cattail Marsh (3.1.1.1) Sedge Wet Meadow (3.2.0.3) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-American Beech Forest (4.1.2.17) Mixed Conifer-Broadleaf Forest (4.1.3) Hawthorn Thicket (4.2.0.4) Late Successional Old Field (6.1.0.1) Old Orchard (7.2) Conifer Plantation (7.3.1) Cultivated Field
Animal Species:	Herptiles: 10 Birds: 33 (B), 11 (P), 19 (O) Mammals: 10 Fish: 15
Earth Science Features:	No published information
Other Designations:	Parkway Belt West Area
Ownership:	Largely Public; small Private areas.

**Criteria Fulfilled**

**Primary Criteria**

- 3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

At least seven native plant communities have been identified to date.

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following nationally or provincially rare plant species have been found in this ESA:

Slender Sedge (*Carex gracilescens*)  
Hawthorn (*Crataegus conspecta*)  
Sharp-leaved Goldenrod (*Solidago arguta var. arguta*)

This ESA contains the following nationally and provincially rare animal species:

Redside dace (*Clinostomus elongatus*)

- 9) Areas that are determined to be significant groundwater discharge areas.**

A sand lens occurs upstream of the ESA and discharges water to the ESA (Axon pers. comm., 1992-93).

- 11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The wooded hillsides and the well-developed floodplain communities serve to maintain surface water quality in Fourteen Mile Creek.

**Secondary Criteria**

- 12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Slender Sedge (*Carex gracilescens*)  
Sedge (*Carex lanuginosa*)  
Round-leaved Hawthorn (*Crataegus chrysocarpa*)  
Hawthorn (*Crataegus conspecta*)

Hawthorn (*Crataegus macrosperma*)  
Hawthorn (*Crataegus schuettei*)  
Fireweed (*Erechtites hieracifolia*)  
Cow-parsnip (*Heracleum lanatum*)  
Eastern Red Cedar (*Juniperus virginiana*)  
Bristly Raspberry (*Rubus setosus*)  
Black Willow (*Salix nigra*)  
Sharp-leaved Goldenrod (*Solidago arguta var. arguta*)  
Southern Arrow-wood (*Viburnum recognitum*)  
Northern Blue Violet (*Viola septentrionalis*)

**Sources of Information**

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Perkins, B. and B. Axon. 1991.  
Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1977, 1981.  
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**ESA 13: Iroquois Shoreline Woods**

**General Description**

This ESA contains a small portion of an embayment along the Glacial Lake Iroquois shoreline (EEAC 1978, Proctor and Redfern 1984). The shoreline within the ESA is in the form of an erosional shore cut into the Halton Till Plain with features such as a wave-cut terrace and an offshore bluff. The glacial Lake Iroquois shoreline is a very significant Pleistocene landform associated with the Lake Ontario basin.

This area is one of high aesthetic value and is composed of a variety of distinct biological communities. The area has been designated a provincially significant life science ANSI because it is a good example of remnant terrace woods (Hanna 1984). It is one of the largest forested upland areas remaining below the Niagara Escarpment between Toronto and Hamilton. The quality of the woodlot is unusually high for the Region and it has been designated a Carolinian Canada site (Allen et al. 1990). The activities of porcupine (*Erethizon dorsatum*) are having a significant impact on the woody vegetation of the site (Axon pers. comm. 1992-93).

The value of this ESA has changed significantly since 1978 because of the loss of the northern part. The proximity to major industrial and residential areas as well as the transportation corridors which border most of this ESA depreciated its value. Also, there is a problem with the dumping of refuse along the perimeter and in the parking lot. The Town of Oakville has developed a comprehensive management plan for the site and maintains the woodlot and trails.

Size:	40 hectares
Plant Species (total #):	249
Plant communities:	Sugar Maple-Mixed Oak Forest (4.1.2.18) Mixed Oak Forest (4.1.2.24) Hawthorn Thicket (4.2.0.4) Late Successional Old Field (6.1.0.1)
Animal Species:	Herptiles: No published information Birds: 22(B), 29(P), 7(O) Mammals: 6
Earth Science Features:	Glacial Lake Iroquois Bluffs and Terraces
Other Designations:	Provincially Significant Life Science ANSI Carolinian Canada Site Parkway Belt West Area
Ownership:	Largely Public; small Private area

**Criteria Fulfilled**

**Primary Criteria**

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following nationally and provincially rare plants have been found in this ESA:

Slender Sedge (*Carex gracilescens*)  
Hawthorn (*Crataegus conspecta*)  
Sharp-leaved Goldenrod (*Solidago arguta* var. *arguta*)

- 7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

This ESA contains a portion of the Glacial Lake Iroquois shoreline. The shoreline within the ESA is in the form of an erosional shore with features such as a wave-cut terrace and an off-shore bluff.

**Secondary Criteria**

- 12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Long-awned Wood Grass (*Brachyelytrum erectum*)  
Slender Sedge (*Carex gracilescens*)  
Sedge (*Carex lanuginosa*)  
Round-leaved Hawthorn (*Crataegus chrysocarpa*)  
Hawthorn (*Crataegus conspecta*)  
Hawthorn (*Crataegus macrosperma*)  
Hawthorn (*Crataegus schuettei*)  
Fireweed (*Erechtites hieracifolia*)  
Smooth Sweet-cicely (*Osmorhiza longistylis*)  
Bristly Raspberry (*Rubus setosus*)  
Sharp-leaved Goldenrod (*Solidago arguta* var. *arguta*)  
Southern Arrow-wood (*Viburnum recognitum*)  
Northern Blue Violet (*Viola septentrionalis*)

- 13) Areas that contain high quality assemblages of native plant and/or animal species.**

The area was chosen as a provincially significant Life Science ANSI on the basis of its excellent hardwood forest.

- 15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The area has been used for undergraduate studies by the University of Toronto (Erindale).

**Sources of Information**

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Perkins, R. 1986.  
Proctor & Redfern. 1984.  
Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1977, 1981.

## **ESA 14: Wildflower Woods**

### **General Description**

This site was originally designated as an ESA in 1978 based on fulfillment of three criteria: uncommon plant communities, high species richness, diversity of vegetation communities and rare plants.

The site has decreased in size since 1978 with the construction of Ford Drive and residential subdivisions. An abandoned portion of former Ninth Line currently bisects the site. Plant communities identified in 1978 as part of the site including; wet meadows, old field, open pond and marsh; were removed as part of development. Communities at the site currently include white elm lowland forest, sugar maple forest, and a mixed forest of sugar maple, white ash and white pine. As such, there is no longer a high diversity of plant communities at the site and the forests that are present are considered to be common in Halton.

The plant species documented for the site currently total approximately 150. Given the substantial information available on the site it is unlikely that the total number of plant species will exceed the 300 needed to fulfill the species diversity criterion. The plant species, rough-leaved goldenrod (*Solidago patula*), which was part of the reason for designation in 1978, is no longer considered to be provincially rare.

Joshua Creek flows through Wildflower Woods which could contribute to the linkage function of the site and the ability of the site to maintain surface water quality. However, Joshua Creek to the north and south of Wildflower Woods is open and in some portions channelized. Given the size of Wildflower Woods in relation to the large open reaches of Joshua Creek and the surrounding urban environment, the ability of the site to function as either a linkage or to maintain surface water quality is not considered significant.

### **Recommendation**

As this site does not appear to fulfill any primary criteria it is recommended that the ESA designation for Wildflower Woods be removed.

### **Criteria Fulfilled**

No primary criteria are fulfilled at this site.



## **ESA 15: Joshua Creek Valley**

### **General Description**

This site was originally designated as an ESA in 1978 based on five criteria: representative earth science features (local sand dunes), high quality plant or animal assemblages, uncommon plant communities, high species richness, diversity of vegetation communities and rare plants.

Residential development has removed the sand dune landform and associated vegetation present in the north portion of this site in 1978. The marsh community documented from the mouth of Joshua Creek is actually in the City of Mississauga and has recently been classified as willow lowland forest (Geomatics 1996). Portions of the floodplain of Joshua Creek are composed of a lowland forest dominated by a mixture of willow, ash, and Manitoba maple, with occasional occurrences of black walnut. If this forest was primarily black walnut, it would be considered an uncommon vegetation community in Halton. However, black walnut is not a dominant in these woods and does not comprise a substantial component of the forest type there. Because of this, the woodland does not comprise an uncommon vegetation community.

The criterion related to high quality plant and/or animal assemblages is not a primary criterion and hence the site could not be designated as an ESA solely on this basis. Joshua Creek Valley has been negatively impacted by the surrounding residential developments. Flood events are common and have undercut the creek banks in places as well as depositing debris along the floodplain. Armourstone and gabion baskets have been used in places to control some of the erosion problems. Disturbances include extensive planned and unplanned (ad hoc) trail systems. Mountain bike ramps and jumps have been constructed in places from soil and downed wood. Yard waste has been dumped in the valley in addition to the typical accumulation of litter and garbage associated with urban trails.

The plant species documented for the site currently total approximately 150, given the substantial information available on the site it is unlikely that the total number of plant species will exceed the 300 required to fulfill the high species diversity criterion. Non-native, invasive species typical of urban areas such as garlic mustard (*Alliaria petiolata*), multiflora rose (*Rosa multiflora*), and Dame's rocket (*Hesperis matronalis*) are present throughout the site. Of the two provincially significant plant species, black walnut and honey locust (*Gleditsia triacanthos*) documented from Joshua Creek Valley, black walnut is no longer considered to be provincially rare, and it is very unlikely that the honey locust is native to the area (Geomatics 1993).

**Recommendation**

As this site does not appear to fulfill any primary criteria it is recommended that the ESA designation for Joshua Creek Valley be removed.

**Criteria Fulfilled**

No primary criteria are fulfilled at this site.

**ESA 16: Sixteen Mile Creek Valley**

**General Description**

Sixteen Mile Creek is an incised valley cut into both the Queenston Formation and Georgian Bay Formation shales. It has an average gradient of about 6.1 m/km with a shale-walled gorge characterizing its central and lower reaches (Karrow 1987a). In addition to the Recent fluvial erosional processes, earth science representation includes the deposition of alluvium (Recent), particularly in the reach south of the Oakville/Milton boundary, and a significant portion of the Trafalgar Moraine (Pleistocene) immediately north of the Oakville/Milton boundary.

The tablelands on either side of the valley are covered in places with mature maple-oak-beech-pine woodlots (EEAC 1978). The area is one of the top botanical sites in Halton Region (Varga and Allen 1990) with almost 400 species of vascular plants recorded. This ESA includes a rich selection of habitats associated with the floodplain, valley walls and associated tablelands.

The southern section of this ESA is threatened by adjacent urban development and there is potential impact from water run off and siltation from the Upper Middle Road Bridge crossing and the Highway 403 crossing. Most of the ESA is privately owned, although the Halton Region Conservation Authority and the Management Board Secretariat own portions.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 16

Size:	1104 hectares
Plant Species (total #):	390
Plant communities:	Forb Rich Wet Meadow (3.2.0.4) Willow Swamp (3.6.1.2) Red Maple Swamp (3.6.3.2) Eastern Hemlock Forest (4.1.1.3) American Elm-Mixed Hardwood Forest (4.1.2.8) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Red Maple-Red Oak Forest (4.1.2.20) Mixed Oak Forest (4.1.2.24) Early Successional-Southern Mixed Hardwood Forest (4.1.2.27) Eastern Hemlock-Mixed Hardwood Forest (4.1.3.3) Late Successional Old Field (6.1.0.1)
Animal Species:	Herptiles: 10 Birds: 11(B), 24(P), 42(O) Mammals: 14 Fish: 33 Insects: 11
Earth Science Features:	Incised Valley Moraine
Other Designations:	Regionally Significant Life Science ANSI Locally Significant Wetland Complex Parkway Belt West Area
Ownership:	Largely Private; HRCA and MBS own small parts.

### Criteria Fulfilled

#### Primary Criteria

#### 2) Areas that provide functional links among two or more adjacent natural systems.

The sheltered and continuous nature of the valley allows movement of wildlife species such as white-tailed deer (*Odocoileus virginianus*) and red fox (*Vulpes vulpes*), and probably is important for the migration of birds (EEAC 1978). The creek is also important for fish migration.

**3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

The variable topography and microclimate of this valley has resulted in an interesting and diverse range of communities, of which eleven have been documented. The valley floor contains good lowland and floodplain associations, while the valley walls contain patches of prairie species on the dry south-facing slopes and moist hemlock communities on adjacent north-facing slopes (EEAC 1978).

**4) Areas that contain large (in a regional context), relatively undisturbed expanses of natural, native plant communities, in particular those that support interior forest conditions.**

This relatively long river valley with its associated aquatic and riparian communities provides an important natural area in the Region.

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following plant and animal species found in this ESA are rare nationally and provincially:

Smooth False Foxglove (*Aureolaria flava*)  
Hawthorn (*Crataegus dissona*)  
Hawthorn (*Crataegus scabrada*)  
Burning Bush (*Euonymus atropurpurea*)  
Wild Yellow Flax (*Linum virginianum*)  
American Gromwell (*Lithospermum latifolium*)  
Virginia Bluebells (*Mertensia virginica*)

Monarch (*Danaus plexippus*)  
Silver Shiner (*Notropis photogenis*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

As in the case of Bronte Creek, excellent exposures of the Queenston Formation are provided in the valley walls. This ESA is particularly significant as it has the most numerous and best exposures of the Georgian Bay Formation within Halton Region. This formation consists of blue, grey and green shales with inter-beds of sandstone, grey-green siltstone and grey argillaceous limestone (Ontario Department of Mines 1976).

The Trafalgar Moraine marks the outer limit of the Peel Ponding. It consists of Halton Till and is the youngest moraine within the Region of Halton. It forms a long low ridge trending southwest to northeast across the Halton Till Plain. The presence of the moraine has affected drainage, forming a local drainage divide on the till plain. The moraine played a significant role in the development of Sixteen Mile Creek at this location following retreat of the Wisconsin Ice Sheet from its position at the Trafalgar Moraine and drainage of the Peel Ponding. The presence of the moraine blocked the southerly flow of the eastern branch of Sixteen Mile Creek, deflecting it toward the southwest where it joined with the western branch. Here the larger stream was able to break through the moraine to drain into Glacial Lake Iroquois.

**9) Areas that are determined to be significant groundwater discharge areas.**

Hydrogeologic studies have indicated that this valley serves as a major groundwater discharge area with seeps along the valley walls (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The well-wooded slopes serve to cool surface water and maintain its quality.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Giant Ragweed (*Ambrosia trifida*)  
Serviceberry (*Amelanchier alnifolia*)  
Spear-leaved Orache (*Atriplex prostrata*)  
Smooth False Foxglove (*Aureolaria flava*)  
Low Bindweed (*Calystegia spithamea*)  
Sedge (*Carex buxbaumii*)  
Narrow-leaved Sedge (*Carex grisea*)  
Richardsons Sedge (*Carex richardsonii*)  
Sedge (*Carex rugosperma*)  
Common Pipsissewa (*Chimaphila umbellata* ssp. *cisatlantica*)  
Hawthorn (*Crataegus dissona*)  
Dodges Hawthorn (*Crataegus dodgei*)  
Hawthorn (*Crataegus macrosperma*)  
Hawthorn (*Crataegus scabrida*)  
Hawthorn (*Crataegus schuettei*)  
Umbrella Sedge (*Cyperus bipartitus*)

Common Hairgrass (*Deschampsia flexuosa*)  
Burning Bush (*Euonymus atropurpurea*)  
Small Bedstraw (*Galium trifidum*)  
Closed Gentian (*Gentiana andrewsii*)  
Intermediate Pinweed (*Lechea intermedia*)  
Wild Yellow Flax (*Linum virginianum*)  
American Gromwell (*Lithospermum latifolium*)  
Wild Crabapple (*Malus coronaria*)  
Virginia Bluebells (*Mertensia virginica*)  
Sycamore (*Platanus occidentalis*)  
Whorled Milkwort (*Polygala verticillata*)  
Smartweed (*Polygonum achoreum*)  
Water Smartweed (*Polygonum amphibium*)  
Bigseed Smartweed (*Polygonum pennsylvanicum*)  
Leafy Pondweed (*Potamogeton foliosus*)  
Pondweed (*Potamogeton nodosus*)  
Chinquapin Oak (*Quercus muhlenbergii*)  
Northern Dewberry (*Rubus flagellaris*)  
Black Willow (*Salix nigra*)  
Bulrush (*Scirpus microcarpus*)  
Late Goldenrod (*Solidago gigantea*)  
White Goldenrod (*Solidago hispida*)  
Nuttalls Bur-reed (*Sparganium americanum*)  
Wood Sage (*Teucrium canadense* ssp. *canadense*)  
Venus Looking-glass (*Triodanis perfoliata*)  
Horned Pondweed (*Zannichellia palustris*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

The diverse plant communities and extensive species lists indicates the presence of high quality communities. Many parts of the ravine are well-wooded with high quality deciduous and mixed forests of maple, oak, hickory, birch, hemlock and eastern white cedar. Excellent individual specimens of black maple, beech and bitternut hickory can be found (EEAC 1978). Also, Varga and Allen (1990) have identified this area as one of the top botanical sites within the Region.

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

When the Smith-Triller Viaduct was constructed, designated lookouts were incorporated into the design so that pedestrians could have the opportunity to view the Sixteen Mile Creek Valley.

**Sources of Information**

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Axon, B. K. and S. Newton-Harrison. 1987.  
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Varga, S. and G.M. Allen. 1990.



## **ESA 17: Milton Heights**

### **General Description**

The predominant earth science feature of the Milton Heights ESA is the Niagara Escarpment. The Escarpment landform has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. Although the formation of the escarpment pre-dates the last glaciation, its present morphology is predominantly due to erosion during the Wisconsin glaciation (Pleistocene).

ESA 17 displays massive cliffs of Amabel Formation dolomite which form the northern edge of the Milton outlier. The Reynales Formation is also exposed in an old quarry located in the northwest portion of the ESA. The Reynales Formation is brown finely crystalline to sublithographic dolomite (Telford et al. 1974).

The outlier is a portion of the Niagara Escarpment which has become detached from the main scarp due to glacial (Pleistocene) and post-glacial (Recent) erosion. The outlier and connecting Lowville re-entrant valley to the south is a provincially significant Earth Science ANSI, Milton Heights (OMNR 1976b, 1983a).

The area immediately above and below the scarp face is mantled with Halton Till (Pleistocene) (Karrow 1987b). The tableland is rolling to hummocky and covered with mature upland vegetation (EEAC 1978).

A large portion of the Milton Heights Bluff is owned by the Halton Region Conservation Authority, however, some parts of this ESA remain in private ownership.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 17

Size:	155 hectares
Plant Species (total #):	371
Plant communities:	Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-Mixed Oak Forest (4.1.2.18) Boreal Paper Birch-Aspen Successional Forest (4.1.2.38) Eastern White Cedar-Paper Birch Forest (4.1.3.9) Late Successional Old Field (6.1.0.1)
Animal Species:	Herptiles: No published information Birds: 1(B), 41(P), 6(O) Mammals: 2
Earth Science Features:	Escarpment Meltwater Channel
Other Designations:	UNESCO MAB Reserve Provincially Significant Earth Science ANSI Niagara Escarpment Plan Area
Ownership:	Largely Public, small amount of Private land

### Criteria Fulfilled

#### Primary Criteria

- 5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

This area supports a rare old growth cedar ecosystem (Larson pers. comm. 1993) and warrants protection from disturbance.

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following provincially rare plant has been identified in this ESA:

Green Milkweed (*Asclepias viridiflora*)  
Ginseng (*Panax quinquefolius*)  
Hispid Buttercup (*Ranunculus hispidus* var. *hispidus*)

- 7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 17

The predominant earth science feature of the Milton Heights ESA is the Niagara Escarpment. The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. This ESA displays massive cliffs of Amabel Formation dolomite which form the northern edge of the Milton outlier. The Reynales Formation is also exposed in an old quarry located in the northwest portion of the ESA. The entire outlier and connecting Lowville re-entrant valley to the south is a provincially significant Earth Science ANSI.

### 9) Areas that are determined to be significant groundwater discharge areas.

Numerous springs along the Escarpment face are evidence of groundwater discharge providing a base flow to many small streams which contribute to Sixteen Mile Creek (Ecologistics 1977).

### Secondary Criteria

### 12) Areas that contain regionally rare plants.

The following regionally rare plant has been identified at this ESA:

Divaricate Rock-cress (*Arabis divaricarpa*)  
Green Milkweed (*Asclepias viridiflora*)  
Green Spleenwort (*Asplenium trichomanes-ramosum*)  
Heath Aster (*Aster ericoides*)  
Purple Clematis (*Clematis occidentalis* var. *occidentalis*)  
Hawthorn (*Crataegus succulenta*)  
Purple Avens (*Geum rivale*)  
Canada Lettuce (*Lactuca canadensis*)  
Wild Crabapple (*Malus coronaria*)  
Perennial Evening-primrose (*Oenothera perennis*)  
Smartweed (*Polygonum achoreum*)  
Hispid Buttercup (*Ranunculus hispidus* var. *hispidus*)  
Swamp Rose (*Rosa palustris*)  
Black Willow (*Salix nigra*)  
Autumn Willow (*Salix serissima*)  
Bulrush (*Scirpus fluviatilis*)  
Late Goldenrod (*Solidago gigantea*)  
Skunk Cabbage (*Symplocarpus foetidus*)  
New York Fern (*Thelypteris noveboracensis*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

The upland deciduous hardwoods that occur on the rolling topography above the Escarpment are relatively undisturbed and of high quality.

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The Milton Heights Bluff is an important feature of the Niagara Escarpment in the Region of Halton. The Bluff can be viewed from the Town of Milton and Highway 401 and is considered to be of extremely high aesthetic value (EEAC 1978).

**Sources of Information**

Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Kaiser, J. 1984.  
Karrow, P.F. 1987b.  
Mazzorato, D. 1980.  
Ontario Ministry of Natural Resources. 1976b, 1983a, 1991a.  
Paton, D. and M.J. Sharp. 1979. (study area extends slightly beyond ESA)  
Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1981.  
Telford, P.G. et al. 1974.  
Totten Sims Hubicki Associates. 1981.

**ESA 18: Crawford Lake - Rattlesnake Point Escarpment Woods**

**General Description**

The Niagara Escarpment is the most dominant earth science feature of the ESA. The Escarpment landform has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. Although the formation of the escarpment pre-dates the last glaciation, its present morphology is predominantly due to erosion during the Wisconsin glaciation (Pleistocene). All bedrock exposures and the main cliff face within this ESA consist of the Amabel Formation dolomite (Silurian). The bedrock exposures of the scarp along the southern edge of the Milton Outlier have been ranked as regionally significant (OMNR 1976b, 1983a). In combination with the Lowville re-entrant valley and Calcium Pits ESA, this area is part of a provincially significant Earth Science ANSI (OMNR 1976b, 1983a).

Crawford Lake forms the upper portion of a bedrock-controlled spillway which includes an abandoned waterfall (immediately west of Guelph Line). Crawford Lake occupies the floor of the spillway and has been identified as a karst sinkhole (EEAC 1978). However, its size and depth suggests other origins (OMNR 1976a, Karrow 1987a) such as erosion by meltwaters and entrained rocks as in the case of Lake Medad (ESA 7). The spillway drained southward toward the Calcium Pits and ultimately into the Lowville re-entrant valley (see description for ESA 19).

The Escarpment forests in this area are mature hardwoods and hemlock, situated on shallow loam soils overlying fissured dolomite bedrock (EEAC 1978). Varga and Allen (1990) indicate that this is one of the top botanical sites in the Region. The area contains a diverse array of vegetative communities including wetlands, escarpment features and uplands. The ESA is within a provincially significant Life Science ANSI, Crawford Lake - Milton Outlier Valley (Riley et al. 1996).

Large portions of this ESA are owned by the Halton Region Conservation Authority. The ESA includes the 31 hectare Nassagaweya Canyon provincially significant wetland complex which is in private ownership, and the provincially significant Crawford Lake/Calcium Pits wetland complex. A sand and gravel quarry is located immediately west of Rattlesnake Point. Scattered rural estate residential developments surround the area (EEAC 1978).

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 18

Size:	664 hectares
Plant Species (total #):	510
Plant communities:	Cattail Marsh (3.1.1.1) Grass Wet Meadow (3.2.0.2) Southern White Cedar Swamp (3.6.2.2) Silver Maple Swamp (3.6.3.3) Mixed Conifer-Broadleaf Forest Swamp (3.6.4) White Pine-Eastern Hemlock Forest (4.1.1.4) Butternut-American Basswood Forest (4.1.2.14) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-American Beech Forest (4.1.2.17) Sugar Maple-Mixed Oak Forest (4.1.2.18) Boreal Paper Birch-Aspen Successional Forest (4.1.2.38) Eastern Hemlock-Mixed Hardwood Forest (4.1.3.3) Eastern White Cedar-Paper Birch Forest (4.1.3.9) Late Successional Old Field (6.1.0.1) Conifer Plantation (7.3.1)
Animal Species:	Herptiles: 23 Birds: 30(B), 66(P), 22(O) Mammals: 26 Fish: 15
Earth Science Features:	Escarpment Incised Valley Roche Moutonnee Sinkholes Moraine Outwash Plain Outwash Fan
Other Designations:	UNESCO MAB Reserve Provincially Significant Life Science ANSI Provincially Significant Earth Science ANSI 2 Provincially Significant Wetland Complexes Niagara Escarpment Plan Area
Ownership:	50% Public, 50% Private

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 18

### Criteria Fulfilled

#### Primary Criteria

- 1) **Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

A total of 420 native plant species have been reported from this ESA.

- 2) **Areas that provide functional links among two or more adjacent natural systems.**

This ESA provides a linkage along the Escarpment between the Calcium Pits ESA and the Milton Heights ESA.

- 3) **Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

This area contains at least 15 plant communities, however, this number will likely be revised upward with the completion of the OMNR ANSI study.

- 4) **Areas that contain large (in a regional context), relatively undisturbed expanses of natural, native plant communities, in particular those that support interior forest conditions.**

The relatively large size (664 ha) and the second highest proportion of native species (86%) among ESAs in the Region, serve to fulfil this criterion.

- 5) **Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

A rare old growth cedar ecosystem is present within this ESA and warrants protection from disturbance. In addition, several significant plant communities were identified by the International Biological Program: these include wet mesic, closed deciduous slope forest, mesic semi-open boulder talus scrub land and open dolomite cliff face. The area is recognized as the best example of talus slope forest in this section of the Niagara Escarpment (MacDonald 1972).

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following plants and animals are rare provincially or nationally:

Neglected Milkvetch (*Astragalus neglectus*)  
Smooth False Foxglove (*Aureolaria flava*)  
Rugulose Grape Fern (*Botrychium rugulosum*)  
Green Violet (*Hybanthus concolor*)

Eastern Pipistrelle (*Pipistrellus subflavus*)  
Woodland Vole (*Microtus pinetorum*)  
Jefferson Salamander (*Ambystoma jeffersonianum*)  
Jefferson/blue-spotted Salamander Complex (*Ambystoma jeffersonianum-laterale*)  
Red-shouldered Hawk (*Buteo lineatus*)  
Peregrine Falcon (*Falco peregrinus anatum*)  
Cerulean Warbler (*Dendroica cerulea*)  
Louisiana Waterthrush (*Seiurus motacilla*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The earth science history of this ESA is complex and varied with significant representation of Palaeozoic, Pleistocene and Recent features and processes. Included within the ESA is a large portion of the Niagara Escarpment, the Milton Outlier, a spillway (Limestone Creek) with thick glaciofluvial deposits and associated outwash fan, an erosional bedrock channel (including Crawford Lake), a complex plain consisting of shallow Wentworth Till and exposed dolomite bedrock ridges, Halton Till, a portion of the Waterdown Moraine, and minor karst processes (Karrow 1987a, OMNR 1976a, 1983b). However, this ESA is part of a provincially significant Earth Science ANSI in combination with the Lowville re-entrant valley and the Calcium Pits ESA (OMNR 1976b, 1983a). The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is also part of an internationally significant landform.

**8) Areas that are determined to contribute significantly to local and/or regional groundwater recharge.**

Although the regional significance of this ESA has not been formally evaluated, its shallow soils and fractured bedrock surface covering a relatively large area would suggest the potential for significant groundwater recharge (Cowell, pers. obs. 1975, 1992).



**9) Areas that are determined to be significant groundwater discharge areas.**

Several small tributaries of Bronte Creek emanate from the springs along the Escarpment Bluff (Ecologistics 1977).

**10) Areas that contribute significantly to groundwater quality.**

The natural vegetation of the ESA and lack of significant pollutant sources within or near the ESA help maintain high recharge water quality. The bedrock aquifer contributes calcium and magnesium to the water which increases water hardness but does not degrade water quality. Information about this function should be obtained as a result of planned studies on the hydrogeology.

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The groundwater flow contributes to numerous springs which feed the headwaters of Bronte Creek. The high quality of this discharge is important for maintaining good surface water quality in Bronte Creek. In addition, the groundwater discharge is relatively cold during the summer period, enhancing the potential for coldwater fish habitat.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Hybrid Baneberry (*Actaea x ludovicii*)  
Divaricate Rock-cress (*Arabis divaricarpa*)  
Tower Mustard (*Arabis glabra*)  
Hairy Rock Cress (*Arabis hirsuta* ssp. *pycnocarpa*)  
Ebony Spleenwort (*Asplenium platyneuron*)  
Green Spleenwort (*Asplenium trichomanes-ramosum*)  
Heath Aster (*Aster ericoides*)  
Neglected Milkvetch (*Astragalus neglectus*)  
Smooth False Foxglove (*Aureolaria flava*)  
Daisy-leaf Moonwort (*Botrychium matricariifolium*)  
Rugulose Grape Fern (*Botrychium rugulosum*)  
Long-awned Wood Grass (*Brachyelytrum erectum*)  
Ear-leaved Brome (*Bromus latiglumis*)  
Hair-like Sedge (*Carex capillaris* ssp. *capillaris*)  
Narrow-leaved Sedge (*Carex grisea*)

Sedge (*Carex trisperma*)  
Hackberry (*Celtis occidentalis*)  
Hornwort (*Ceratophyllum demersum*)  
Purple Clematis (*Clematis occidentalis* var. *occidentalis*)  
Spotted Coral-root (*Corallorhiza maculata*)  
Slender Cliff-brake (*Cryptogramma stelleri*)  
Hybrid Wood Fern (*Dryopteris x neo-wherryi*)  
Hybrid Wood Fern (*Dryopteris x uliginosa*)  
Slender Wheat Grass (*Elymus trachycaulus*)  
Soft Willow-herb (*Epilobium strictum*)  
Purple Avens (*Geum rivale*)  
Tall Blue Lettuce (*Lactuca biennis*)  
Star Duckweed (*Lemna trisulca*)  
Running Club-moss (*Lycopodium clavatum*)  
Schrebers Satin Grass (*Muhlenbergia schreberi*)  
Smooth Sweet-cicely (*Osmorhiza longistylis*)  
Virginia Creeper (*Parthenocissus quinquefolia*)  
Spring Clearweed (*Pilea fontana*)  
Bluegrass (*Poa alsodes*)  
Water Smartweed (*Polygonum amphibium*)  
Filiform Pondweed (*Potamogeton filiformis*)  
Blunt-leaved Pondweed (*Potamogeton obtusifolius*)  
Yellow Water-crowfoot (*Ranunculus flabellaris*)  
Autumn Willow (*Salix serissima*)  
Large-fruited Snakeroot (*Sanicula trifoliata*)  
Hard-stemmed Bulrush (*Scirpus acutus*)  
Lesser Bladderwort (*Utricularia minor*)  
Smooth Highbush Blueberry (*Vaccinium corymbosum*)  
Smooth White Violet (*Viola macloskeyi*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

This ESA has the second highest proportion of native to non-native plants (86%) of all ESAs in the Region. Varga and Allen (1990) have also identified this site as one of the top botanical sites within Halton.

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The splendid views from Rattlesnake Point and Crawford Lake as well as the view of Rattlesnake Point from the Peel Plain are considered highly aesthetic and are well known landmarks.

- 15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

Crawford Lake has been widely studied by scientific groups from various universities. The undisturbed sediment bed provides a rich source of information on vegetation types over the centuries. An Indian village was also located near the lake, dating back to the thirteenth century (EEAC 1978).

**Sources of Information**

Axon, B. K. and S. Newton-Harrison. 1987.  
Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Gould, J. 1985c.  
Kaiser, J. 1984.  
Karrow, P.F. 1987a.  
MacDonald, I. 1972.  
Mazzorato, D. 1980.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1983a, 1983b, 1988, 1991a, 1991b.  
Paton, D. and M.J. Sharp. 1979.  
Regional Municipality of Halton. 1978, 1982.  
Riley et al. 1996  
Royal Botanical Gardens. 1981.  
Varga, S. and G.M. Allen. 1990.

## **ESA 19: Calcium Pits**

### **General Description**

This ESA forms the southern portion of a large provincially significant Earth Science ANSI (see description for ESA 18) referred to as Milton Heights (OMNR 1976b, 1983b). The spillway and marl deposits have also been designated a regionally significant Earth Science ANSI (OMNR 1976b, 1983a). The marl pits were mined in the 1920s and 1930s. The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

The valley occupied by the headwaters of Bronte Creek forms the main re-entrant which was cut by the glaciers as they advanced over the escarpment (Pleistocene). The Crawford Lake area (ESA 18) and meltwater channel which formerly flowed to the southwest toward the Calcium Pits (ESA 19) form a single late glacial meltwater system which drained meltwater away from the ice front (Pleistocene). Earth science features represented within the Calcium Pits ESA include a bedrock controlled meltwater channel (Pleistocene), glaciofluvial meltwater deposits (Pleistocene) and marl (soft calcium carbonate) deposits (Recent).

The Escarpment trench contains wetlands which are suitable habitat for orchids (EEAC 1978, Geomatics International 1991). The area is a provincially significant wetland complex of 116 ha, 70% of which is in public ownership. The valley floor supports a large, relatively undisturbed, conifer-dominated swamp.

A large part of this ESA is owned by the Halton Region Conservation Authority (Axon pers. comm. 1992-93) and most of it is in a relatively undisturbed state (EEAC 1978). Further plant inventory work needs to be undertaken at this site to develop the species and communities lists. Currently, there are two regionally significant Life Science ANSIs within this ESA, the Killbride Swamp and Crawford Lake South.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 19

Size:	369 hectares (914 acres)
Plant Species (total #):	357 species observed
Plant communities:	Broadleaf Forest (4.1.2) Alkaline Escarpment/Cliff (4.7.3)
Animal Species:	Herptiles: 20 Birds: 18(B), 32(P), 7(O) Mammals: 10 Fish: 11
Earth Science Features:	Escarpment Marl Deposits Meltwater Channel
Other Designations:	UNESCO MAB Reserve 2 Regionally Significant Life Science ANSIs Provincially and Regionally Significant Earth Science ANSI Provincially Significant Wetland Complex Niagara Escarpment Plan Area
Ownership:	Largely Public 70%, Private 30%

### Criteria Fulfilled

#### Primary Criteria

- 1) Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

A total of 305 native plant species have been reported from this ESA.

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following plants and animals are rare nationally and provincially:

Green Violet (*Hybanthus concolor*)  
 Ginseng (*Panax quinquefolius*)  
 Jefferson salamander (*Ambystoma jeffersonianum*)  
 Jefferson/blue-spotted Salamander Complex (*Ambystoma jeffersonianum-laterale*)  
 Least Bittern (*Ixobrychus exilis*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

Earth science features represented within this ESA include the meltwater channel, glacial outwash material, an abandoned waterfall, and marl deposits. The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

**9) Areas that are determined to be significant groundwater discharge areas.**

Although not fully evaluated, the presence of the calcium pits and associated wetlands would suggest significant groundwater discharge is occurring within the ESA from several springs (Axon pers. comm. 1992-93). The calcium is derived by the chemical precipitation of lime as a result of degassing of groundwaters as they exit the bedrock environment.

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The groundwater discharge to the calcium pits, although high in total hardness, likely has high water quality. The high quality of this discharge is important for maintaining good surface water quality in Bronte Creek.

### **Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Hybrid Soft Maple (*Acer x freemanii*)  
Tower Mustard (*Arabis glabra*)  
Northern Aster (*Aster borealis*)  
Marsh Bellflower (*Campanula aparinoides*)  
Prairie Sedge (*Carex prairea*)  
Sedge (*Carex sprengelii*)  
Sedge (*Carex trisperma*)  
Umbel-like Sedge (*Carex umbellata*)  
Hornwort (*Ceratophyllum demersum*)  
Round-leaved Hawthorn (*Crataegus chrysocarpa*)  
Slender Cliff-brake (*Cryptogramma stelleri*)  
Whorled Loosestrife (*Decodon verticillatus*)  
Soft Willow-herb (*Epilobium strictum*)  
Variegated Horsetail (*Equisetum variegatum*)

Small Bedstraw (*Galium trifidum*)  
Fringed Gentian (*Gentianopsis crinita*)  
Purple Avens (*Geum rivale*)  
Glomerate Satin Grass (*Muhlenbergia glomerata*)  
Spring Clearweed (*Pilea fontana*)  
Small Round-leaved Orchid (*Platanthera orbiculata*)  
Smaller Purple-fringed Orchid (*Platanthera psycodes*)  
Bluegrass (*Poa alsodes*)  
Smartweed (*Polygonum achoreum*)  
Yellow Water-crowfoot (*Ranunculus flabellaris*)  
Bog Willow (*Salix pedicellaris*)  
Autumn Willow (*Salix serissima*)  
Large-fruited Snakeroot (*Sanicula trifoliata*)  
Bog Goldenrod (*Solidago uliginosa*)  
Shiny Ladies Tresses (*Spiranthes lucida*)  
Lesser Bladderwort (*Utricularia minor*)  
Smooth White Violet (*Viola macloskeyi*)

- 15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The habitat diversity and unusual plant associations combined with the significant geological features provide an excellent educational area. This locale is used by the Boy Scouts of Canada for recreational and educational sessions (EEAC 1978).

### **Sources of Information**

Axon, B. K. and S. Newton-Harrison. 1987.  
Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Geomatics International Inc. 1991.  
Kaiser, J. 1984.  
Mazzorato, D. 1980.  
Mullen, L., et al. 1982.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1983a, 1983b, 1988, 1991a, 1991b, 1992a.  
Regional Municipality of Halton. 1978, 1982.  
Riley et al. 1996  
Royal Botanical Gardens. 1977, 1981.  
Sutherland, D. 1981.

## **ESA 20: Guelph Junction Woods**

### **General Description**

The Guelph Junction Woods is an extensive undisturbed mixed forest and wetland located on the Flamborough Plain physiographic region with thin soils over dolomite bedrock. The area features extensive rock outcrops and wetland areas (Crawford Lake Calcium Pits and Guelph Junction Woods wetlands) with several tributaries of the Bronte Creek dissecting the area. The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, a portion of this ESA is part of an internationally significant landform. The varied topography affords a diversity of biological communities and it is among the top ten botanical sites in the Region (Varga and Allen 1990).

The Guelph Junction Woods is largely undeveloped with the exception of some rural estate strip development along concession roads and disturbance and encroachment in the area northeast of Guelph Junction and to the west of Second Line. The area encompasses part of the provincially significant, Guelph Junction Wetland Complex. The extreme topography and poor drainage of these large wetlands has historically limited the use of the land. The area is in public and private ownership with a forest tract owned by the Regional Municipality of Halton and managed by the Ministry of Natural Resources, and parts of the ESA owned by the Halton Region Conservation Authority.



# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 20

Size:	745 hectares
Plant Species (total #):	155
Plant communities:	Meadow Marsh (3.2) Larch-Eastern White Cedar Swamp (3.6.2.3) Red Maple Swamp (3.6.3.2) Rich Sugar Maple-Mixed Hardwood (4.1.2.15) Red Maple-Red Oak Forest (4.1.2.20) Mixed Conifer-Broadleaf Forest (4.1.3) Shrub Thicket (4.2) Hawthorn Thicket (4.2.0.4) Conifer Plantation (7.3.1)
Animal Species:	Herptiles: 1 Birds: No published information Mammals: 5 Fish: 17
Earth Science Features:	No published information
Other Designations:	UNESCO MAB Reserve Provincially Significant Wetland Complex Niagara Escarpment Plan Area
Ownership:	Largely Private (80%) Public 20%

### Criteria Fulfilled

#### Primary Criteria

- 4) Areas that contain large (in a regional context), relatively undisturbed expanses of natural, native plant communities.**

The Guelph Junction escarpment forest is an extensive forest tract providing suitable habitat for large game animals such as white-tailed deer (*Odocoileus virginianus*). In addition, the complex is surrounded by further woodland areas and river valley links to other blocks of suitable habitat.

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following plant is considered provincially rare:

Handsome Sedge (*Carex formosa*)

**8) Areas that are determined to contribute significantly to local and/or regional groundwater recharge.**

The area is part of an extensive headwater region of the Bronte Creek. Major recharge is evident as water infiltrates into the shallow permeable overburden and recharges the fractured dolomite aquifer. Groundwater also occurs as numerous seeps along the Escarpment face (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The large (116 hectare), provincially significant wetland complex areas serve to contribute towards the maintenance of high surface water quality.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Cuckoo-flower (*Cardamine pratensis*)  
Sheathed Sedge (*Carex vaginata*)  
Fireweed (*Epilobium angustifolium*)  
Woodland Horsetail (*Equisetum sylvaticum*)  
Purple Avens (*Geum rivale*)  
Pale-spiked Lobelia (*Lobelia spicata*)  
Mountain-holly (*Nemopanthus mucronatus*)  
Smooth Sweet-cicely (*Osmorhiza longistylis*)  
Interrupted Fern (*Osmunda claytoniana*)  
Northern Beech Fern (*Phegopteris connectilis*)  
Black Spruce (*Picea mariana*)  
Large-Leaved Pondweed (*Potamogeton amplifolius*)  
Small Pondweed (*Potamogeton pusillus*)  
Yellow Water-crowfoot (*Ranunculus flabellaris*)  
Great Water Dock (*Rumex orbiculatus*)  
Black Willow (*Salix nigra*)  
Bog Goldenrod (*Solidago uliginosa*)  
Marsh St. Johns-wort (*Triadenum fraseri*)  
Speedwell (*Veronica catenata*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

The low number of non-native species in this ESA qualify this area as a high quality assemblage. Varga and Allen (1990) have also identified this area as one of the top botanical sites within the Region.

**Sources of Information**

Axon, B. K. and S. Newton-Harrison. 1987.  
Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Kaiser, J. 1984.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1984, 1992a.  
Paton, D. and M.J. Sharp. 1979.  
Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1977, 1981.  
Sutherland, D. 1981.  
Totten Sims Hubicki Associates. 1981.  
Varga, S. and G.M. Allen. 1990.

**ESA 21: Moffat Swamp**

**General Description**

Moffat Swamp is largely a silver maple-black ash swamp which serves as the headwater of the Bronte Creek and has been listed as a provincially significant wetland complex by OMNR (Badenoch-Moffat Wetland Complex). Part of the area lies in the Town of Milton, while a contiguous section including a cedar swamp lie in Puslinch Township and has been identified as an ESA in Wellington County (EEAC 1978).

Moffat Swamp is located near an existing settlement area. This wetland is partly owned by the HRCA with some private holdings (EEAC 1978).

Size:	100 hectares
Plant Species (total #):	< 100 species observed
Plant communities:	Southern White Cedar Swamp (3.6.2.2) Silver Maple Swamp (3.6.3.3) Mixed Conifer-Broadleaf Forest (4.1.3) Conifer Plantation (7.3.1)
Animal Species:	Herptiles: No published information Birds: No published information Mammals: No published information Fish: 7
Earth Science Features:	Moraine
Other Designations:	Provincially Significant Wetland Complex
Ownership:	Private

**Criteria Fulfilled**

**Primary Criteria**

**9) Areas that are determined to be significant groundwater discharge areas.**

This area is a seepage-catchment area receiving its water through aquifers by groundwater movement from the deep till deposits of the surrounding moraine (Eagles et al. 1977). A hydrogeological study has indicated discharge to streams with significant wetland storage (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The relatively undisturbed swamp serves to maintain high surface water quality.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

The following regionally rare plant has been found in this ESA:

Skunk Currant (*Ribes glandulosum*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

The mature Red Maple - Black Ash headwater swamp is relatively undisturbed and of high quality (EEAC 1978).

**Sources of Information**

Armour, E. et al. 1979.  
Axon, B. K. and S. Newton-Harrison. 1987.  
Crins, W.J. 1986.  
Eagles, P.F.J. et al. 1977.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Kaiser, J. 1984.  
Klinkenberg, R. 1984.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1992a.  
Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1977, 1981.

**ESA 22: Brookville Swamp**

**General Description**

The area is almost entirely wooded with a good quality mature silver maple-balsam poplar-cedar complex. The area is low-lying between hilly areas and is part of the Halton Escarpment provincially significant wetland complex. There are a number of drier areas which contain sugar maple, ash and white pine (EEAC 1978). Brookville Swamp is identified by the Ministry of Natural Resources as a regionally significant Life Science ANSI (OMNR 1991b).

Size:	116 hectares
Plant Species (total #):	< 100 species observed
Plant communities:	Silver Maple Swamp (3.6.3.3) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15)
Animal Species:	Herptiles: No published information Birds: No published information Mammals: No published information Fish: 4
Earth Science Features:	No published information
Other Designations:	Regionally Significant Life Science ANSI Provincially Significant Wetland Complex
Ownership:	Private

**Criteria Fulfilled**

**Primary Criteria**

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The relatively undisturbed swamp, and its function as a headwater source for a tributary to Sixteen Mile Creek, contributes to the maintenance of high surface water quality.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Hybrid Soft Maple (*Acer x freemanii*)  
Star Duckweed (*Lemna trisulca*)  
Running Club-moss (*Lycopodium clavatum*)  
Interrupted Fern (*Osmunda claytoniana*)  
New York Fern (*Thelypteris noveboracensis*)  
Dotted Water-meal (*Wolffia borealis*)

**Sources of Information**

Axon, B. K. and S. Newton-Harrison. 1987.  
Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Kaiser, J. 1984.  
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Ontario Ministry of Natural Resources. 1976a, 1976b, 1991b, 1992a.  
Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1981.  
Sutherland, D. 1981.

**ESA 23: Knatchbull Swamp**

**General Description**

The Knatchbull Swamp is a large forested wetland area located in the Blue Springs Creek watershed, which drains into the Grand River system via the Eramosa River. The Knatchbull wetland complex (389 hectares) is ranked by OMNR as a provincially significant wetland complex. Extensive tracts of mature red maple alternate with dense cedar stands. It is a relatively undisturbed tract of land possessing a variety of small distinct ecological habitats. However, the construction of a drainage ditch by a private landowner may be impacting the local hydrology. The physiography of the area is dominated by the hummocky topography of the Galt Moraine which is composed of Wentworth Till overlying dolomite bedrock. The wet soils consist predominantly of mesisols (EEAC 1978). Knatchbull Swamp is identified by the Ministry of Natural Resources as a regionally significant Life Science ANSI (OMNR 1976a). The area is privately owned.

Size:	229 hectares
Plant Species (total #):	<100 species observed
Plant communities:	Southern White Cedar Swamp (3.6.2.2) Red Maple Swamp (3.6.3.2)
Animal Species:	Herptiles: 3 Birds: 6(B), 0(P), 0(O) Mammals: 4
Earth Science Features:	Moraine
Other Designations:	Regionally Significant Life Science ANSI Provincially Significant Wetland Complex
Ownership:	Private

**Criteria Fulfilled**

**Primary Criteria**

- 8) Areas that are determined to contribute significantly to local and/or regional groundwater recharge.**

This area serves an important groundwater recharge function (Klinkenberg 1984).



**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The hydrogeological study undertaken within Halton indicated that the Knatchbull Swamp exhibits significant wetland storage. The area also serves as a headwater swamp for the Blue Springs Creek (Ecologistics 1977).

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plant:

variegated horsetail (*Equisetum variegatum*)

**Sources of Information**

Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Gore & Storrie. 1989.  
Kaiser, J. 1984.  
Klinkenberg, R. 1984.  
Landplan Collaborative Ltd. 1986a, 1986b.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1991b, 1992a.  
Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1977.

**ESA 24: Blue Springs Swamp**

**General Description**

The Blue Springs Swamp is one of several wetland areas located in the north-western section of the Region of Halton. It is included by OMNR as part of the Arkell-Corwhin wetland complex, a provincially significant wetland complex which extends into Wellington County. The physiography consists of thin Wentworth Till over dolomite bedrock. The wet organic soils are mesisols. Major plant communities include mature red maple swamp, a mixed lowland forest and an open grassy wet meadow area.

The area is in private and public ownership (Regional Municipality of Halton 1982).

Size:	202 hectares
Plant Species (total #):	<100 species observed
Plant communities:	Grass Wet Meadow (3.2.0.2) Red Maple Swamp (3.6.3.2) Mixed Conifer-Broadleaf Forest Swamp (3.6.4)
Animal Species:	No published information
Earth Science Features:	Moraine
Other Designations:	Provincially Significant Wetland Complex
Ownership:	Private & Public

**Criteria Fulfilled**

**Primary Criteria**

- 5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

The red maple swamp is largely undisturbed and of good quality. This wet forest with a rich herbaceous ground cover is uncommon within the Region of Halton (EEAC 1978).

- 11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The Blue Springs Swamp is a headwater of the Blue Springs Creek. The large open water swamp and marshy pond provide significant wetland storage (Ecologistics 1977).

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

The following regionally rare plants have been found in this ESA:

Sedge (*Carex pallescens*)

Divaricate Rock-cress (*Arabis divaricarpa*)

**Sources of Information**

Crins, W.J. 1986.

Ecological and Environmental Advisory Committee. 1978.

Ecologistics Ltd. 1977.

Kaiser, J. 1984.

Klinkenberg, R. 1984.

Ontario Ministry of Natural Resources. 1976a, 1976b, 1992a.

Regional Municipality of Halton. 1978, 1982.

Royal Botanical Gardens. 1977, 1981.

**ESA 25: Hilton Falls Complex**

**General Description**

This ESA includes a large section of the Niagara Escarpment and incorporates the largest area of shallow till/bedrock plain of all Halton ESAs. Earth science features which have been mapped for this area include glacial striae on bedrock (Pleistocene), a large bedrock/shallow till complex (Pleistocene), pockets of organic deposits, a small pocket of glaciolacustrine silt and clay, and small areas of Halton Till at the base of the escarpment (Karrow 1987b). A regionally significant earth science ANSI (Milton Quarry) has been designated within this ESA.

The dominant landform of the Hilton Falls ESA is the Niagara Escarpment. The Escarpment landform has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. Although the formation of the escarpment pre-dates the last glaciation, its present morphology is predominantly due to erosion during the Wisconsin glaciation (Pleistocene). Amabel Formation (Silurian) outcrops form the valley walls of the Hilton Falls reservoir (OMNR 1976a, 1983a). Outcrops of the Reynales, Cabot Head and Whirlpool Formations (Silurian) occur within the larger quarries located at the face of the escarpment (Telford et al. 1974).

The Hilton Falls Complex is Halton's largest ESA at 2646 ha. It contains a variety of forest covers including mature hardwoods and mixed woods situated on the shallow dolomite plain. The area is a headwater for several tributaries of the Sixteen Mile Creek with numerous beaver dams creating further wetlands. The ESA is included within the provincially significant Halton-Escarpment wetland complex. The area includes two provincially significant Life Science ANSIs, Halton Forest North and South (Riley et al. 1996). The extensive woods above the Escarpment provide a wide variety of ecological habitats, contributing to this area's renown as an outstanding natural area (EEAC 1978). The ESA has the second richest vascular flora among Halton's ESAs and is reported to be one of the top botanical sites in the Region (Varga and Allen 1990). Neighbouring extractive industries have had a significant impact on the ESA in the Sixth Line area, where changes in hydrology have resulted in the drying of beaver ponds and the loss of significant salamander breeding areas (M.J. Sharp, pers. obs. 1992). The potential for restoration in this area should be evaluated. Large portions of the Hilton Falls Complex are owned by the Halton Region Conservation Authority and the Regional Municipality of Halton.

# HALTON REGION Environmentally Sensitive Areas Update

ESA N° 25

Size:	2646 hectares
Plant Species (total #):	639
Plant communities:	<p>Cattail Marsh (3.1.1.1)            Grass Wet Meadow (3.2.0.2)            Willow Swamp (3.6.1.2)            Silver Maple Swamp (3.6.3.3)            Mixed Conifer-Broadleaf Forest Swamp (3.6.4)            White Pine-Eastern Hemlock Forest (4.1.1.4)            Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15)            Sugar Maple-Mixed Oak Forest (4.1.2.18)            Mixed Oak Forest (4.1.2.24)            Trembling Aspen Successional Forest (4.1.2.29)            Eastern Hemlock-Mixed Hardwood Forest (4.1.3.3)            Eastern White Cedar-Paper Birch Forest (4.1.3.9)            Sumac Thicket (4.2.0.1)            Warm Dry Alkaline Escarpment/Cliff (4.7.3.3)            Late Successional Old Field (6.1.0.1)            Conifer Plantation (7.3.1)</p>
Animal Species:	<p>Herptiles: 27            Birds: 49(B)(although Iden 1967 reports 111), 67(P), 17(O)            Mammals: 26            Fish: 18            Insects: 1</p>
Earth Science Features:	<p>Escarpment            Dolomite Pavement            Sinkholes            Roche Moutonnee</p>
Other Designations:	<p>UNESCO MAB Reserve            2 Provincially Significant Life Science ANSIs            Regionally Significant Earth Science ANSI            Provincially Significant Wetland Complex            Niagara Escarpment Plan Area</p>
Ownership:	Public & Private

**Criteria Fulfilled**

**Primary Criteria**

**1) Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

The varied terrain and mixed forest provides suitable habitat for an outstanding variety of plant and animal species: 500 species of native plants have been recorded and at least 111 species of birds have been reported to breed here, including 14 species of warblers (needs confirmation) (Iden 1967 as cited in EEAC 1978). This ESA ranks second among Halton's ESAs with respect to vascular plant species richness. This ESA also supports populations of beaver (*Castor canadensis*), northern flying squirrel (*Glaucomys sabrinus*), bobcat (*Lynx rufus*), West Virginia white butterfly (*Pieris virginianus*) and a large population of white-tailed deer (*Odocoileus virginianus*) (EEAC 1978).

**2) Areas that provide functional links among two or more adjacent natural systems.**

The Hilton Falls Complex is a large ESA which provides a linkage function for migrating raptors and passerines between Milton Heights and Guelph Junction Woods to the south and the Speyside Escarpment Woods to the northeast.

**3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

The area has an unusually high diversity of biological communities.

**4) Areas that contain large (in a regional context), relatively undisturbed expanses of natural, native plant communities, in particular those that support interior forest conditions.**

The Hilton Falls Complex is well known for its extensive forest tract covering several square miles. This is by far the largest forest within the Regional Municipality of Halton (EEAC 1978).

**5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

A rare old growth cedar ecosystem (Larson pers. comm. 1993) is present within this ESA and warrants protection from disturbance.

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 25

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following plants and animals within this ESA are rare nationally or provincially:

Hart's-tongue Fern (*Asplenium scolopendrium* var. *americanum*)

Cuckoo Flower (*Cardamine pratensis* ssp. *angustifolia*)

Careys Sedge (*Carex careyana*)

Handsome Sedge (*Carex formosa*)

Slender Sedge (*Carex gracilescens*)

Hawthorn (*Crataegus apiomorpha*)

Green Violet (*Hybanthus concolor*)

Woodland Satin Grass (*Muhlenbergia sylvatica*)

Ginseng (*Panax quinquefolius*)

Languid Spear Grass (*Poa languida*)

Red-shouldered Hawk (*Buteo lineatus*)

Red-headed Woodpecker (*Melanerpes erythrocephalus*)

Cerulean Warbler (*Dendroica cerulea*)

Louisiana Waterthrush (*Seiurus motacilla*)

Jefferson Salamander (*Ambystoma jeffersonianum*)

Jefferson/blue-spotted Salamander Complex (*Ambystoma jeffersonianum-laterale*)

Five-lined Skink (*Eumeces fasciatus*)

West Virginia White (*Pieris virginianensis*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The Hilton Falls Complex contains a regionally significant Earth Science ANSI (OMNR 1976b, 1983a). It was designated on the basis of the Amabel Formation (Silurian) outcrops which form the valley walls of the Hilton Falls Reservoir (Geomatics International 1991). Outcrops of the Reynales, Cabot Head and Whirlpool Formations (Silurian) and the extensive thin till/exposed bedrock plain are also significant earth science components. A 10 metre high waterfall and potholes along the watercourse of the 16 mile creek are also found within this ESA (Tovell 1992). The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

**8) Areas that are determined to contribute significantly to local and/or regional groundwater recharge.**

There is evidence of local recharge to the fissured dolomite bedrock (Ecologistics 1977).

**9) Areas that are determined to be significant groundwater discharge areas.**

Major discharges occur here to the high quality streams in the vicinity (Ecologistics 1977).

**10) Areas that contribute significantly to groundwater quality.**

The large size of the area and the well forested nature of the ESA contribute significantly to groundwater quality.

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The wetlands in this ESA and seepage from the base of the Escarpment feed the headwaters of Sixteen Mile Creek. The high quality of these discharges is important for maintaining good surface water quality in Sixteen Mile Creek. In addition, the groundwater discharge is relatively cold during the summer period, enhancing the potential for coldwater fish habitat.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Sweet-flag (*Acorus americanus*)  
Ticklegrass (*Agrostis scabra*)  
Groundnut (*Apios americana*)  
Divaricate Rock-cress (*Arabis divaricarpa*)  
Tower Mustard (*Arabis glabra*)  
Ebony Spleenwort (*Asplenium platyneuron*)  
Hart's-tongue Fern (*Asplenium scolopendrium* var. *americanum*)  
Long-awned Wood Grass (*Brachyelytrum erectum*)  
Cuckoo-flower (*Cardamine pratensis* ssp. *angustifolia*)  
Aquatic Sedge (*Carex aquatilis*)  
Sedge (*Carex atherodes*)  
Shorter Sedge (*Carex brevior*)



# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 25

Carey's Sedge (*Carex careyana*)  
Sedge (*Carex cephaloidea*)  
Slender Sedge (*Carex gracilescens*)  
Sedge (*Carex sprengelii*)  
Long-beaked Sedge (*Carex sychnocephala*)  
Hornwort (*Ceratophyllum demersum*)  
Leatherleaf (*Chamaedaphne calyculata*)  
Striped Coral-root (*Corallorhiza striata*)  
Golden Corydalis (*Corydalis aurea* ssp. *aurea*)  
Hawthorn (*Crataegus apiomorpha*)  
Round-leaved Hawthorn (*Crataegus chrysocarpa*)  
Hawthorn (*Crataegus macrosperma*)  
Hawthorn (*Crataegus succulenta*)  
Slender Cliff-brake (*Cryptogramma stelleri*)  
Pinnate Tansy-mustard (*Descurainia pinnata* ssp. *brachycarpa*)  
Dutchmans Breeches (*Dicentra cucullaria*)  
Benedicts Wood Fern (*Dryopteris x benedictii*)  
Hybrid Wood Fern (*Dryopteris x dowellii*)  
Hybrid Wood Fern (*Dryopteris x uliginosa*)  
Fireweed (*Epilobium angustifolium*)  
Soft Willow-herb (*Epilobium strictum*)  
Woodland Horsetail (*Equisetum sylvaticum*)  
Variegated Horsetail (*Equisetum variegatum*)  
Robins Plantain (*Erigeron pulchellus*)  
Stiff Marsh Bedstraw (*Galium tinctorium*)  
Small Bedstraw (*Galium trifidum*)  
Fringed Gentian (*Gentianopsis crinita*)  
Purple Avens (*Geum rivale*)  
Pale-leaved Sunflower (*Helianthus strumosus*)  
Tall Blue Lettuce (*Lactuca biennis*)  
Canada Lettuce (*Lactuca canadensis*)  
Star Duckweed (*Lemna trisulca*)  
Wild Crabapple (*Malus coronaria*)  
Water-marigold (*Megalodonta beckii*)  
Smiths Melic Grass (*Melica smithii*)  
Common Satin Grass (*Muhlenbergia frondosa*)  
Woodland Satin Grass (*Muhlenbergia sylvatica*)  
Mountain-holly (*Nemopanthus mucronatus*)  
Northern Adders-tongue (*Ophioglossum pusillum*)  
One-sided Pyrola (*Orthilia secunda*)  
Smooth Sweet-cicely (*Osmorhiza longistylis*)  
Dwarf Ginseng (*Panax trifolius*)  
Slender-leaved Panic Grass (*Panicum linearifolium*)

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 25

Virginia Creeper (*Parthenocissus quinquefolia*)  
Black Spruce (*Picea mariana*)  
Spring Clearweed (*Pilea fontana*)  
Bluegrass (*Poa alsodes*)  
Water Smartweed (*Polygonum amphibium*)  
Smartweed (*Polygonum punctatum*)  
Slender Pondweed (*Potamogeton berchtoldii*)  
Small Pondweed (*Potamogeton pusillus*)  
Yellow Water-crowfoot (*Ranunculus flabellaris*)  
Skunk Currant (*Ribes glandulosum*)  
Prickly Rose (*Rosa acicularis* ssp. *sayi*)  
Great Water Dock (*Rumex orbiculatus*)  
Valerands Water-pimpernel (*Samolus valerandi* ssp. *parviflorus*)  
Clustered Snakeroot (*Sanicula odorata*)  
Large-fruited Snakeroot (*Sanicula trifoliata*)  
Hard-stemmed Bulrush (*Scirpus acutus*)  
Bulrush (*Scirpus hattorianus*)  
Common Three-square (*Scirpus pungens*)  
Nuttalls Bur-reed (*Sparganium americanum*)  
Common Bur-reed (*Sparganium eurycarpum*)  
Small Bur-reed (*Sparganium natans*)  
New York Fern (*Thelypteris noveboracensis*)  
Venus Looking-glass (*Triodanis perfoliata*)  
Rock Elm (*Ulmus thomasii*)  
Smooth Highbush Blueberry (*Vaccinium corymbosum*)  
Water-celery (*Vallisneria americana*)  
Speedwell (*Veronica catenata*)  
Marsh Speedwell (*Veronica scutellata*)  
Smooth White Violet (*Viola macloskeyi*)  
Northern Blue Violet (*Viola septentrionalis*)  
Malta Violet (*Viola x malteana*)  
Dotted Water-meal (*Wolffia borealis*)

### **13) Areas that contain high quality assemblages of native plant and/or animal species.**

This ESA contains a high quality assemblage of plants and ranks seventh among Halton's ESAs with respect to the proportion of its flora which is native (80%).

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 25

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The combination of an extensive mixed forest tract, a scenic waterfall and the Niagara Escarpment create an area having a high aesthetic value (EEAC 1978).

**15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The large diversity of natural habitats, along with the unique geological features characteristic of this area, have made it ideal for hosting numerous scientific studies, the majority of which have been concentrated within the Hilton Falls Conservation Area.

### **Sources of Information**

Axon, B. K. and S. Newton-Harrison. 1987.  
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Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
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Geomatics International Inc. 1991.  
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Gould, J. 1985d.  
Iden, P. 1967.  
Jakab, S., L. Densmore, and S. Warren. 1980.  
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Ontario Ministry of Natural Resources. 1976a, 1976b, 1983a, 1988, 1991a, 1992a.  
Paton, D. and M.J. Sharp. 1979.  
Proctor & Redfern. 1982.  
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Regional Municipality of Halton. 1978, 1982.  
Riley et al. 1996  
Royal Botanical Gardens. 1977, 1981.  
Sharp, M.J. 1980.  
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Telford, P.G. et al. 1974.  
Varga, S. and G.M. Allen. 1990.

## **ESA 26: Blue Springs Creek Valley**

### **General Description**

This valley is an extremely valuable earth science resource within the Region of Halton. Features and processes within this ESA include fluvial processes (Recent), deposition of alluvium (Recent), organic accumulation (Recent), a bedrock controlled meltwater channel (Pleistocene), glaciofluvial outwash deposits (Pleistocene), and karst features and processes (Recent and Late Pleistocene).

The Blue Springs Creek originated as a major meltwater channel which served to drain the Wisconsin glacier as it retreated from the Paris, Galt and Moffat moraine positions. Abundant meltwater carrying large crystalline boulders eroded into the bedrock plain removing existing morainal material. Localized deposits of glaciofluvial sands and gravels were left within the valley as meltwater volume decreased in the latter stages of retreat. The channel of the creek has an extremely low gradient resulting in the formation of wetlands and accumulation of organic material along its length. This low gradient reflects its origin as a meltwater channel and its current status as an underfit stream. Erosion by the meltwater removed surficial material on either side of the stream for some distance resulting in exposure of the soluble Amabel dolomites. Post glacial rainfall and stream activity on this exposed rock has resulted in the development of karst processes as surface waters dissolve the bedrock creating subterranean routes to the creek. Landforms associated with this process include sinkholes, caves and springs.

The ESA is located within the provincially significant Eramosa River - Blue Springs Creek wetland complex which extends into Wellington County. Blue Springs Creek is a tributary of the Eramosa River in the Grand River watershed. Excellent tamarack - spruce - cedar swamp communities with associated fen and marl pools are located east of Sixth Line on the valley floor. This area has been designated a regionally significant life science ANSI by the OMNR (Klinkenberg 1984). There is an eastern white cedar forest throughout the bottomland and along the moist slopes of the valley (EEAC 1978).

Blue Springs Valley is almost entirely privately owned. The GRCA is currently (1994) undertaking an Open Space Study on the Eramosa River and Blue Springs Creek.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 26

Size:	683 hectares
Plant Species (total #):	201
Plant communities:	Grass Wet Meadow (3.2.0.2) Open Marl Fen (3.4.1.4) Southern White Cedar Swamp (3.6.2.2) Southern Boreal Swamp (3.6.2.5) Eastern White Cedar Forest (4.1.1.1) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Late Successional Old Field (6.1.0.1)
Animal Species:	Herptiles: 6 Birds: 0(B), 0(P), 30(O) Mammals: 6 Fish: 1
Earth Science Features:	Dolomite Pavement Solution Caves Sinkholes Meltwater Channel
Other Designations:	Regionally Significant Life Science ANSI Provincially Significant Wetland Complex
Ownership:	Largely Private, small amount Public land

### Criteria Fulfilled

#### Primary Criteria

**2) Areas that provide functional links among two or more adjacent natural systems.**

Blue Springs Creek Valley provides a connection between Acton Swamp ESA 28 and the Paris Morainal Complex ESA 39.

**5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

The tamarack-spruce-cedar swamp is uncommon and of high quality, providing habitat for several plants unusual in the Region (EEAC 1978). The open marl fen community is a rare plant community south of the Canadian Shield (Riley 1989b).

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

This ESA contains the following nationally and provincially rare species:

Carey's sedge (*Carex careyana*)  
Larger Water-starwort (*Callitriche heterophylla* var. *heterophylla*)

Jefferson salamander (*Ambystoma jeffersonianum*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The significance of this ESA is based on the presence of the best displayed erosional meltwater channel (bedrock controlled) within the Region, the relationship between the meltwater channel and former ice front positions as represented by the Galt and Paris moraines, and the active karst processes.

**9) Areas that are determined to be significant groundwater discharge areas.**

Blue Springs Creek Valley is acting as a significant groundwater discharge zone (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

Blue Springs Creek Valley provides significant wetland storage (Ecologistics 1977) and, therefore, helps maintain base flow. The well vegetated wetlands and associated ponds contribute towards maintaining high water quality in this tributary to the Eramosa River (EEAC 1978).

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Green Spleenwort (*Asplenium trichomanes-ramosum*)  
Heath Aster (*Aster ericoides*)  
Larger Water-starwort (*Callitriche heterophylla* var. *heterophylla*)  
Marsh Bellflower (*Campanula aparinoides*)  
Carey's sedge (*Carex careyana*) Sedge (*Carex pallescens*)  
Striped Coral-root (*Corallorhiza striata*)

Matted Spike-rush (*Eleocharis intermedia*)  
Variegated Horsetail (*Equisetum variegatum*)  
Robins Plantain (*Erigeron pulchellus*)  
Closed Gentian (*Gentiana rubricaulis*)  
Mares-tail (*Hippuris vulgaris*)  
Eastern Red Cedar (*Juniperus virginiana*)  
Canada Lettuce (*Lactuca canadensis*)  
Kalms Lobelia (*Lobelia kalmii*)  
Hairy Honeysuckle (*Lonicera hirsuta*)  
Slender Najas (*Najas flexilis*)  
Perennial Evening-primrose (*Oenothera perennis*)  
True Wood-sorrel (*Oxalis acetosella* ssp. *montana*)  
Pondweed (*Potamogeton natans*)  
Meadow Spike-moss (*Selaginella eclipes*)  
Bog Goldenrod (*Solidago uliginosa*)  
Rock Elm (*Ulmus thomasii*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

The tamarack-spruce-cedar swamp is of high quality, providing habitat for several plants unusual to the Region. The cedar valley lands and slopes also provide excellent wildlife habitat. The stream supports a brook trout (*Salvelinus fontinalis*) population. These populations are becoming increasingly uncommon due to their requirements for high water quality (EEAC 1978). The flora of this ESA has a high proportion of native species (78%).

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The deep, tree covered valley, in combination with the excellent trout stream and wetlands, provides an area acknowledged as having high aesthetic value within the Regional Municipality of Halton (EEAC 1978).

**Sources of Information**

Boyle, B. and R. Blackport. 1988.  
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# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 26

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Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1981.  
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# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 27

### ESA 27: Fairy Lake Marsh

#### General Description

This extensive cattail marsh connects to the south end of Fairy Lake. The marsh is bounded by a rocky upland of white birch and white cedar to the east, and a tamarack, cedar, white spruce swamp to the south and west (EEAC 1978). This ESA is part of the provincially significant Eramosa River-Blue Springs Creek wetland complex.

Encroaching development is having a major effect on Fairy Lake Marsh. Presently, the eastern side is bordered by a housing development (Blowers, pers. comm. 1994). Landfill along two sections of the marsh will result in siltation and further deterioration of the quality of this wetland. Approximately 10% of the ESA is owned by the town of Halton Hills, the remainder is held privately.

Size:	68 hectares
Plant Species (total #):	214
Plant communities:	Cattail Marsh (3.1.1.1) Southern White Cedar Swamp (3.6.2.2) Southern Boreal Swamp (3.6.2.5) Eastern White Cedar Forest (4.1.1.1) Large Tooth Aspen Successional Forest (4.1.2.28)
Animal Species:	Herptiles: No published information Birds: 0(B), 0(P), 49(O) Mammals: No published information Fish: 3
Earth Science Features:	Meltwater Channel
Other Designations:	Provincially Significant Wetland Complex Credit Valley Conservation Authority ESA # 41 Niagara Escarpment Planning Area
Ownership:	Largely Private (90%), Public (10%)

**Criteria Fulfilled**

**Primary Criteria**

**5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

Large marshes have virtually disappeared in Halton Region due to landfilling and drainage of marsh communities. Thus, Fairy Lake Marsh is a remnant of a habitat which was once quite common. It is one of only two large cattail marshes known to remain in the region (EEAC 1978). A 3 hectare fen community also exists within this ESA. Fens are considered to be rare plant communities south of the Canadian Shield in Ontario (Riley 1989b).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

Fairy Lake Marsh serves as a headwater wetland to Black Creek. The vegetation and organic soils of this wetland provide a filtering mechanism such that the quality of recharge water from the wetland to the creek is improved.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Marsh Bellflower (*Campanula aparinoides*)  
Perennial Evening-primrose (*Oenothera perennis*)  
Smaller Purple-fringed Orchis (*Platanthera psycodes*)  
Hard-stemmed Bulrush (*Scirpus acutus*)

**Sources of Information**

Credit Valley Conservation Authority. 1985.  
Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Jakab, S., L. Densmore, and S. Warren. 1980.  
Kaiser, J. 1984.  
Klinkenberg, R. 1984.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1992a.  
Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1977, 1981.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 28

### ESA 28: Acton Swamp

#### General Description

Acton Swamp is a large mixed swamp which is part of the provincially significant Halton-Escarpment wetland complex. The dominant trees are white cedar, white birch, ash, balsam poplar and red maple. There are also heavy thickets of winterberry holly. Closed canopy areas that receive little light contain a ground cover of wetland plants including Labrador tea. The bedrock of the swamp is Amabel Formation dolomite with mesisolic organic soils.

The quarry east of Acton Swamp, represents the major potential source of impact in the area. Quarry operations extend to the eastern border of the area, north of No 22 Sideroad (Regional Road 43) and there is a proposal for a private landfill within the quarry. The area south of Regional Road 43 is also licensed for extraction. The ESA is privately owned (EEAC 1978).

Size:	123 hectares
Plant Species (total #):	207*
Plant communities:	Southern White Cedar Swamp (3.6.2.2) Red Maple Swamp (3.6.3.2) Eastern White Cedar Forest (4.1.1.1) Sugar Maple-American Beech Forest (4.1.2.17) White Pine-Northern Mixed Hardwood Forest (4.1.3.5) Eastern White Cedar-Mixed Hardwood Forest (4.1.3.7)
Animal Species:	No published information
Earth Science Features:	No published information
Other Designations:	Provincially Significant Wetland Complex Niagara Escarpment Plan Area
Ownership:	Private

\* Total number of plant species does not currently correspond with database

**Criteria Fulfilled**

**Primary Criteria**

- 8) Areas that are determined to contribute significantly to local and/or regional groundwater recharge.**

This large wetland serves an important water storage function (Ecologistics 1977).

- 9) Areas that are determined to be significant groundwater discharge areas.**

This wetland serves as an important water storage area, with groundwater discharging into tributaries of the Credit River and Sixteen Mile Creek (Holysh, pers. comm. 1994).

- 10) Areas that contribute significantly to groundwater quality.**

The filtering mechanism provided by the vegetation and organic soils of this ESA serve to maintain groundwater quality.

- 11) Areas that contribute significantly to maintaining surface water quality and quantity.**

This large well-vegetated swamp serves to maintain surface water quality.

**Secondary Criteria**

- 12) Areas that contain regionally rare plants.**

The following regionally rare plants are found in Acton Swamp:

Daisy-leaf Moonwort (*Botrychium matricariifolium*)  
Common Pipsissewa (*Chimaphila umbellata* ssp. *cisatlantica*)  
Fireweed (*Epilobium angustifolium*)  
Downy Rattlesnake-plantain (*Goodyera pubescens*)  
Canada Lettuce (*Lactuca canadensis*)  
Swamp Fly Honeysuckle (*Lonicera oblongifolia*)  
Mountain-holly (*Nemopanthus mucronatus*)  
One-sided Pyrola (*Orthilia secunda*)  
Black Willow (*Salix nigra*)

**Sources of Information**

Axon, B. K. and S. Newton-Harrison. 1987.  
Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Jakab, S., L. Densmore, and S. Warren. 1980.  
Kaiser, J. 1984.  
Klinkenberg, R. 1984.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1992a.  
Regional Municipality of Halton. 1978, 1982.  
Royal Botanical Gardens. 1977, 1981.

## **ESA 29: Speyside Escarpment Woods**

### **General Description**

The dominant landform of the Speyside Escarpment Woods ESA is the Niagara Escarpment. The Escarpment landform has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. Although the formation of the escarpment pre-dates the last glaciation, its present morphology is predominantly due to erosion during the Wisconsin glaciation (Pleistocene). Outcrops within the Speyside Escarpment Woods include the Reynales, Cabot Head and the Amabel Formation (Silurian) (Telford et al. 1974).

Most of the ESA has been mapped as bedrock drift complex (Pleistocene) with deposits of Halton Till (Pleistocene) found around the perimeter. Poorly sorted ice contact gravels (Pleistocene), and pockets of organic material (Recent) have also been identified within the ESA (Karrow 1987b).

The expansive tract of woodland located along the Niagara Escarpment provides a rich diversity of habitats, alternating between dry upland communities dominated by sugar maple and wet lowlands of red and silver maple swamp. The area supports a variety of interesting and unusual plants, as well as providing habitat for a diversified avifauna (EEAC 1978). It is part of the provincially significant Halton-Escarpment wetland complex. It also contains a regionally significant Life Science ANSI.

There is a potential threat of impact from development along the roads which cut through or approach this area. Housing is found on Highway 25, Sideroads No 15 and 17, and Third Line north and south from the forest (EEAC 1978).

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 29

Size:	632 hectares
Plant Species (total #):	330
Plant communities:	Southern White Cedar Swamp (3.6.2.2) Red Maple Swamp (3.6.3.2) White Pine Forest (4.1.1.7) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Eastern Hemlock-Mixed Hardwood Forest (4.1.3.3) Hawthorn Thicket (4.2.0.4)
Animal Species:	Herptiles: 18 Birds: 37(B), 23(P), 5(O) Mammals: 7 Fish: 5
Earth Science Features:	Escarpment Dolomite Pavement
Other Designations:	UNESCO MAB Reserve Regionally Significant Life Science ANSI Provincially Significant Wetland Complex Niagara Escarpment Plan Area
Ownership:	Largely Private (90%), Public (10%)

### Criteria Fulfilled

#### Primary Criteria

- 2) Areas that provide functional links among two or more adjacent natural systems.**

This ESA provides an important forest link along the Escarpment between the Hilton Falls Complex (ESA 25) to the south-west and Limehouse Cliffs and Woods to the north-east (ESA 31).

- 4) Areas that contain large (in a regional context), relatively undisturbed expanses of natural, native plant communities, in particular those that support interior forest conditions.**

At 632 ha, Speyside Escarpment Woods is Halton's sixth largest ESA and provides extensive blocks of suitable forest for many species of wildlife intolerant of human presence (EEAC 1978).

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 29

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following nationally or provincially rare species have been identified within this ESA:

*Hawthorn (Crataegus scabrida)*

Jefferson Salamander (*Ambystoma jeffersonianum*)

Jefferson/blue-spotted salamander complex (*Ambystoma jeffersonianum-laterale*)

Hooded Warbler (*Wilsonia citrina*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The dominant landform of the Speyside Escarpment Woods ESA is the Niagara Escarpment. The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. It provides excellent representation of the shallow till - exposed bedrock plain.

**8) Areas that are determined to contribute significantly to local and/or regional groundwater recharge.**

Although the regional significance of this ESA has not been formally evaluated, its shallow soils and fractured bedrock surface covering a relatively large area indicate its significance for groundwater recharge (Holysh, pers. comm. 1994).

**9) Areas that are determined to be significant groundwater discharge areas.**

This ESA serves as a source of streams flowing south-east as tributaries of Sixteen Mile Creek (Ecologistics 1977).

**10) Areas that contribute significantly to groundwater quality.**

The large wooded area provides significant area for water percolation and results in steady flows to the springs emanating from the base of the Escarpment.

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The well-wooded area provides cool shade for the headwaters of the many tributaries of Sixteen Mile Creek.



**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Hybrid Soft Maple (*Acer x freemanii*)  
Smooth Rock-cress (*Arabis laevigata*)  
Hawthorn (*Crataegus scabrida*)  
Hawthorn (*Crataegus succulenta*)  
Cow-parsnip (*Heracleum lanatum*)  
Star Duckweed (*Lemna trisulca*)  
Bristly Crowfoot (*Ranunculus pensylvanicus*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

This area appears to be a high quality, relatively undisturbed escarpment woodland with associated escarpment face, and forested talus slope.

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The cool shady forests and luxuriant wetlands together with the relative silence makes this area enjoyable. The rolling hillsides and high quality vegetation provide for aesthetically pleasing experiences (EEAC 1978).

**Sources of Information**

Axon, B. K. and S. Newton-Harrison. 1987.  
Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Ecoplans Ltd. 1979.  
Kaiser, J. 1984.  
Karrow, P.F. 1987b.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1991b, 1992.  
Regional Municipality of Halton. 1978, 1982.  
Riley et al. 1996  
Royal Botanical Gardens. 1977, 1981.  
Telford, P.G. et al. 1974.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 30

### ESA 30: Waterfall Woods

#### General Description

Waterfall Woods is composed of two woodlot communities; an upland area dominated by sugar maple and a closed mixed swamp of white cedar, yellow birch, ash and red maple with a scattering of eastern hemlock and tamarack. Small ponds and marshes are scattered in the southeast corner, and the Niagara Escarpment, which cuts across the southern arm, provides an interesting topographic contrast (EEAC 1978). The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. This ESA is also part of the provincially significant Acton-Silver Creek wetland complex (OMNR 1992a). The majority of the site is still relatively undisturbed. There is a large abandoned quarry east of the Sixth Line. Some rural estate development is located in the area and heavy logging has degraded some parts. A variety of birds have been observed in the area (EEAC 1978).

Size:	415 hectares
Plant Species (total #):	< 100 species observed
Plant communities:	Eastern White Cedar-Mixed Hardwood Swamp (3.6.4.3) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-Mixed Oak Forest (4.1.2.18) Eastern Hemlock-White Pine-Hardwood Forest (4.1.3.1)
Animal Species:	Herptiles: No published information Birds: No published information Mammals: No published information Fish: 3
Earth Science Features:	Escarpment Meltwater Channel
Other Designations:	UNESCO MAB Reserve Provincially Significant Wetland Complex Credit Valley Conservation Authority ESA # 42 Niagara Escarpment Plan Area
Ownership:	Private

**Criteria Fulfilled**

**Primary Criteria**

- 2) Areas that provide functional links among two or more adjacent natural systems.**

This ESA provides a linkage along the Escarpment between the Limehouse Cliffs and Woods (ESA 31) to the south and Silver Creek Valley (ESA 32) to the north.

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following nationally or provincially rare species have been identified within this ESA:

Neglected Milkvetch (*Astragalus neglectus*)  
Redside Dace (*Clinostomus elongatus*)

- 7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

This ESA contains a short section of the Niagara Escarpment. The escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

**Secondary Criteria**

- 12) Areas that contain regionally rare plants.**

The following regionally rare plant species has been found within this ESA:

Neglected Milkvetch (*Astragalus neglectus*)

- 14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The Silver Creek Valley in the north east section of Waterfall Woods is a very picturesque narrow valley containing a small waterfall (EEAC 1978).

**Sources of Information**

Credit Valley Conservation Authority. 1985.  
Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Kaiser, J. 1984.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1983a, 1992a.  
Regional Municipality of Halton. 1978.  
Royal Botanical Gardens. 1977, 1981.

## **ESA 31: Limehouse Cliffs and Woods**

### **General Description**

The dominant landform of the Limehouse Cliffs and Woods ESA is the Niagara Escarpment. The Escarpment landform has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. Although the formation of the escarpment pre-dates the last glaciation, its present morphology is predominantly due to erosion during the Wisconsin glaciation (Pleistocene).

The cliffs of this ESA, particularly in the vicinity of the Canadian National Railway Cut have good exposures of Silurian (Amabel, Reynales and Cabot Head Formations) bedrock (OMNR 1976b, 1983a).

Halton Till (Pleistocene) deposits dominate the ground cover in this ESA. Modern alluvium deposits (Recent) cut through the central portion of the area marking the valley of Black Creek (Karrow 1987b). This valley formed part of a meltwater channel (Pleistocene) during the recession of the Wisconsin Ice Sheet as indicated by older terraced glaciofluvial deposits located downstream.

The slopes of the steep valley are forested with sugar maple, ash, beech, pine and hemlock with broadleaf forests and old field communities on the adjacent uplands. Along the Escarpment, fissured rocks shelter many ferns and other interesting plants. Historical artifacts, including the remains of lime kilns and an old mill, are found within the ESA (EEAC 1978). Black Creek, a tributary of the Credit River, runs through this ESA, and also runs through Stewarttown Woods (ESA 41) and Hungry Hollow Ravine (ESA 37). A provincially significant class 3 wetland complex is found within the ESA. Approximately half of the ESA is owned by the Credit Valley Conservation Authority. The remaining valley lands could be impacted by rural estate development. Public acquisition of these areas as conservation lands should be considered (EEAC 1978).

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 31

Size:	132 hectares
Plant Species (total #):	< 100 species observed
Plant communities:	Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-Mixed Oak Forest (4.1.2.18) Eastern White Cedar-Mixed Hardwood Forest (4.1.3.7) Hawthorn Thicket (4.2.0.4) Late Successional Old Field (6.1.0.1)
Animal Species:	Herptiles: No published information Birds: No published information Mammals: No published information Fish: 11
Earth Science Features:	Escarpment Crevice Caves, Fissures Meltwater Channel
Other Designations:	UNESCO MAB Reserve Provincially Significant Wetland Complex Credit Valley Conservation Authority ESA # 17 Niagara Escarpment Plan Area
Ownership:	Public 50%, Private 50%

### Criteria Fulfilled

#### Primary Criteria

**2) Areas that provide functional links among two or more adjacent natural systems.**

Limehouse Cliffs and Woods provide a connecting link between the Waterfall Woods to the north and the Speyside Escarpment Woods to the south.

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following nationally or provincially rare species has been identified within this ESA:

Redside Dace (*Clinostomus elongatus*)

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 31

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. The cliff exposures in the vicinity of the Canadian National Railways Cut have good exposures of Silurian bedrock. (OMNR 1976b, 1983a).

**9) Areas that are determined to be significant groundwater discharge areas.**

This area contributes groundwater to Black Creek through the bedrock and overburden aquifers found within the ESA (Ecologistics 1979).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The wooded slopes help maintain Black Creek (which is a tributary of the Credit River) as a coldwater stream. The stream supports brook trout (*Salvelinus fontinalis*) populations (EEAC 1978).

### **Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plant:

Cow-parsnip (*Heracleum lanatum*).

### **Sources of Information**

Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1979.  
Kaiser, J. 1984.  
Karrow, P.J. 1987b.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1983a.  
Regional Municipality of Halton. 1978.  
Royal Botanical Gardens. 1981.

## **ESA 32: Silver Creek Valley**

### **General Description**

The dominant landform of the Silver Creek Valley ESA is the Niagara Escarpment. The Escarpment landform has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. Although the formation of the escarpment pre-dates the last glaciation, its present morphology is predominantly due to erosion during the Wisconsin glaciation (Pleistocene).

The quarry on the south side of the Glen Williams Outlier has exposures of the Fossil Hill Formation (Silurian). It is the southernmost exposure of this rock before it grades into the Reynales Formation (OMNR 1976b, 1983a). Also exposed in outcrop within this ESA are the Cabot Head Formation and Whirlpool Sandstone (Silurian) and the Queenston Formation (Ordovician) (Telford et al. 1976).

Silver Creek Valley occupies a meltwater channel (Pleistocene) which was responsible for the separation of the Glen Williams Outlier from the main escarpment. The bedrock exposure in the 3 m waterfall along Snow's Creek displays the Fossil Hill Formation-Reynales Formation transition with characteristics common to both strata. Blue-grey shale below this formation may represent the most northerly exposure of the Thorold Formation. This waterfall has been designated as an Earth Science ANSI and ranked as regionally significant due to the importance of these transitional sequences (OMNR 1976b, 1983a). Outwash gravels (Pleistocene) have been mapped in the southern portion of the ESA while poorly sorted ice contact deposits are located along the western boundary. The crest of a small moraine has been identified cutting through the northeastern corner of the ESA. Pockets of Halton Till (Pleistocene) are found along the edges of the ESA (Karrow, 1987b).

Silver Creek Valley is a young, narrow, tributary valley on the edge of the Niagara Escarpment. The upland areas support a maple, ash, beech forest as well as numerous old fields. The western side of the valley supports a rich maple, ash, basswood seepage slope forest, while the eastern side supports a drier forest of birch and cedar in the north half and an open scree slope in the south half. Varga and Allen (1990) noted that the area is one of the top botanical sites in the Region. The bottom of the valley has a scrub wetland of willow and dogwood which grades into an open cattail meadow towards the valley mouth (EEAC 1978). The ESA is located within the provincially significant Acton-Silver Creek wetland complex.

The area is excellent for birds and other species characteristic of undisturbed, dense forests. The Credit Valley Conservation Authority owns approximately half of this ESA. (EEAC 1978, Regional Municipality of Halton 1982). This ESA is contiguous with



# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 32

Snow's Creek Valley (ESA 34). Silver Creek Valley previously contained two Life Science ANSIs, one regionally significant and the other provincially significant. These Life Science ANSIs have been combined into one provincially significant Life Science ANSI (Riley et al. 1996).

Size:	501 hectares
Plant Species (total #):	422
Plant communities:	Submerged Aquatic Community (1.1.1) Floating-Leaved Aquatic Community (1.1.2) Cattail Marsh (3.1.1.1) Willow Swamp (3.6.1.2) Southern White Cedar Swamp (3.6.2.2) American Elm-Mixed Hardwood Swamp (3.6.3.8) Black Ash Swamp (3.6.3.10) White Pine-Eastern Hemlock Forest (4.1.1.4) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Trembling Aspen Successional Forest (4.1.2.29) Eastern Hemlock-Mixed Hardwood Forest (4.1.3.3) Late Successional Old Field (6.1.0.1)
Animal Species:	Herptiles: 11 Birds: 16(B), 48(P), 6(O) Mammals: 7 Fish: 16
Earth Science Features:	Escarpment Meltwater Channel Outwash Plain
Other Designations:	UNESCO MAB Reserve 2 Provincially Significant Life Science ANSIs Regionally Significant Earth Science ANSI Provincially Significant Wetland Complex Credit Valley Conservation Authority ESA # 22 Niagara Escarpment Plan Area
Ownership:	Public 50%, Private 50%

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 32

### Criteria Fulfilled

#### Primary Criteria

- 1) **Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

This area is reported to contain 342 native species of vascular plants, which ranks fifth among Halton's ESAs.

- 2) **Areas that provide functional links among two or more adjacent natural systems.**

Silver Creek Valley provides a linkage between Waterfall Woods (ESA 30) to the south, Terra Cotta Woods (ESA 35) to the north and Snow's Creek Woods (ESA 34) to the west.

- 3) **Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

Varga et al. (1994b), has identified 65 plant communities (based on his system of classification) in a Life Science ANSI report. Some of these will likely be combined when the Kavanagh and McKay-Kuja (1992) classification is applied.

- 4) **Areas that contain large (in a regional context), relatively undisturbed expanses of natural, native plant communities, in particular those that support interior forest conditions.**

This ESA consists of a relatively large section of the Escarpment on either side of Silver Creek Valley (501 ha) and is contiguous with Snow's Creek Woods (ESA 34) which is an additional 141 ha. These areas contribute to the significant natural aspect of the Niagara Escarpment.

- 6) **Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following plants and animals are rare nationally or provincially:

Neglected Milkvetch (*Astragalus neglectus*)  
Hair Cap Moss (*Atrichum angustatum*)  
Ragged Moss (*Cirriphyllum piliferum*)  
Hypnum Moss (*Hypnum curvifolium*)  
Ginseng (*Panax quinquefolius*)  
Hypnum Moss (*Platydictya confervoides*)

Jefferson Salamander (*Ambystoma jeffersonianum*)  
American Brook Lamprey (*Lampetra appendix*)  
Redside Dace (*Clinostomus elongatus*)  
Red-shouldered Hawk (*Buteo lineatus*)  
Louisiana Waterthrush (*Seiurus motacilla*)

Black-crowned Night Heron (*Nycticorax nycticorax*)  
Hooded Warbler (*Wilsonia citrina*)  
Northern Long-eared Bat (*Myotis septentrionalis*)  
Southern Flying Squirrel (*Glaucomys volans*)

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. Silver Creek Valley occupies a Pleistocene meltwater channel which was responsible for the separation of the Glen Williams Outlier from the main Escarpment. The waterfall, illustrating the transition between the Fossil Hill and Reynales formations has been designated a regionally significant Earth Science ANSI (OMNR 1976b, 1983a).

**9) Areas that are determined to be significant groundwater discharge areas.**

There is a major discharge of groundwater to tributary streams of the Credit River system (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quality.**

Silver Creek Valley is a large relatively undisturbed valley with significant water storage capacity which serves to maintain high quality surface waters.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

The following regionally rare plants have been found in this ESA:

Hybrid Soft Maple (*Acer x freemanii*)  
Tower Mustard (*Arabis glabra*)  
Heath Aster (*Aster ericoides*)  
Canada Milkvetch (*Astragalus canadensis*)  
Neglected Milkvetch (*Astragalus neglectus*)  
Sedge (*Carex sprengei*)  
Hawthorn (*Crataegus succulenta*)  
Benedicts Wood Fern (*Dryopteris x benedictii*)  
Matted Spike-rush (*Eleocharis intermedia*)  
Variegated Horsetail (*Equisetum variegatum*)  
Stiff Marsh Bedstraw (*Galium tinctorium*)  
Hairy Honeysuckle (*Lonicera hirsuta*)  
Spring Clearweed (*Pilea fontana*)  
Bluegrass (*Poa alsodes*)  
Pondweed (*Potamogeton natans*)  
Yellow Water-crowfoot (*Ranunculus flabellaris*)  
Valerands Water-pimpernel (*Samolus valerandi* ssp. *parviflorus*)  
Stout Goldenrod (*Solidago squarrosa*)  
Common Bur-reed (*Sparganium eurycarpum*)

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

This steep-sided valley, with several excellent scenic lookouts, offers spectacular scenery from the floodplain or upland. Its abundance of wildlife, plants and natural communities and the presence of the Bruce Trail make it an excellent place for passive recreation with high aesthetic value (EEAC 1978).

**15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The Credit Valley Conservation Authority owns the Silver Creek Education Centre within the boundaries of this ESA, and the area is utilized by one of the local school boards as an outdoor education centre.

**Sources of Information**

Abrey, N. 1975.  
Crins, W.J. 1986.  
Credit Valley Conservation Authority. 1992b. (study area extends slightly beyond ESA)  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977, 1979.  
Gould, J. 1985e.  
Kaiser, J. 1984.  
Karrow, P.F. 1987b.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1983a, 1988, 1991a, 1991b.  
Regional Municipality of Halton. 1978, 1982.  
Riley et al. 1996  
Royal Botanical Gardens. 1981.  
Telford, P.G. et al. 1974.  
Varga, S. and G.M. Allen. 1990.  
Varga, et al. 1994b.  
W. E. Coates and Associates Ltd. 1977.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 33

### ESA 33: Ballinafad Pond

#### General Description

The Ballinafad Pond ESA is located within the kame and kettle (Pleistocene) topography which forms a portion of the Moffat Moraine (Karrow 1968). Surficial deposits consist of poorly- sorted ice contact sands and gravels. Ballinafad Pond is a kettle lake formed as the ice sheet retreated during the latter stages of the Wisconsin glaciation. Kettle depressions are formed due to the melting of large ice blocks which had separated from the ice front and were covered in sand and gravel washed out of the glacier, this area has been designated a provincially significant life science ANSI (Gould 1989). This ESA is also located within the provincially significant Acton-Silver Creek wetland complex. Varga and Allen (1990) indicate that this is one of the top botanical sites in the Region

The area is largely undisturbed due to its lack of ready access. An access road has been cut through the northern forest to the water's edge but is not heavily used. The only apparent potential impacts may be increased educational and recreational use in the area. This ESA is held within private ownership (EEAC 1978).

Size:	14 hectares
Plant Species (total #):	< 100 species observed
Plant communities:	Submerged Aquatic Community (1.1.1) Floating-Leaved Aquatic Community (1.1.2) Open Low Shrub Bog (3.5.1.4) Treed Sphagnum Bog (3.5.2.1) Winterberry/Mountain Holly Thicket Swamp (3.6.1.8) Red Maple Swamp (3.6.3.2) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15)
Animal Species:	No published information
Earth Science Features:	Meltwater Channel Moraine Kettle
Other Designations:	Provincially Significant Life Science ANSI Provincially Significant Wetland Complex Credit Valley Conservation Authority ESA # 21 Niagara Escarpment Planning Area
Ownership:	Private

**Criteria Fulfilled**

**Primary Criteria**

- 3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.**

Considering the small size of the area, there is an exceptional diversity of plant communities.

- 5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

The black spruce (*Picea mariana*) - tamarack (*Larix laricina*) bog is an example of a northern wetland community sustaining plant species that are near the southern edge of their ranges (EEAC 1978). Bogs are rare in Ontario south of the precambrian shield (Riley 1989b).

- 7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The deep pond is a kettle lake, a distinctive landform which is rare in Halton Region. There are only a few small kettle lakes in the Region and all occur in the immediate vicinity of Ballinafad Pond.

**Secondary Criteria**

- 12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare species:

Black Chokeberry (*Aronia melanocarpa*)  
Sedge (*Carex trisperma*)  
Leatherleaf (*Chamaedaphne calyculata*)  
Moccasin Flower (*Cypripedium acaule*)  
Whorled Loosestrife (*Decodon verticillatus*)  
Virginia Cotton-grass (*Eriophorum virginicum*)  
Mountain-holly (*Nemopanthus mucronatus*)  
Black Spruce (*Picea mariana*)  
Pitcher-plant (*Sarracenia purpurea*)  
Smooth Highbush Blueberry (*Vaccinium corymbosum*)  
Large Cranberry (*Vaccinium macrocarpon*)

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 33

Small Cranberry (*Vaccinium oxycoccos*)  
Virginia Chain-fern (*Woodwardia virginica*)

### **Sources of Information**

Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1979.  
Kaiser, J. 1984.  
Karrow, P.F. 1968.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1988, 1991a.  
Regional Municipality of Halton. 1978.  
Royal Botanical Gardens. 1977.  
Sutherland, D. 1981.  
Varga, S. and G.M. Allen. 1990.



# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 34

### ESA 34: Snow's Creek Woods

#### General Description

The Niagara Escarpment, which runs through this ESA, has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

This ESA includes a small wooded wetland situated along the base of a south-facing slope. The drier upper slopes support fair to good quality broadleaf forests of beech and sugar maple while water drainage to the lowland in the south has created a variety of lowland communities including cedar swamp, graminoid marsh and mixed lowland forests (EEAC 1978). The ESA is included within the provincially significant Acton-Silver Creek wetland complex. Cultivated fields, pasture and old fields surround the area and concession roads and Highway 7 border and transect the forest. The dense interior remains largely undisturbed. Snow's Creek Woods is valuable as a water storage and recharge area as well as habitat for unusual orchids (EEAC 1978).

Size:	141 hectares
Plant Species (total #):	504*
Plant communities:	Marsh (3.1) Southern White Cedar Swamp (3.6.2.2) Mixed Conifer-Broadleaf Forest Swamp (3.6.4) Sugar Maple-American Beech Forest (4.1.2.17) Conifer Plantation (7.3.1)
Animal Species:	Herptiles: 5 Birds: 2(B), 0(P), 73(O) Mammals: 4 Fish: 13
Earth Science Features:	Meltwater Channel Moraine
Other Designations:	UNESCO MAB Reserve Provincially Significant Wetland Complex Regional Earth Science ANSI Credit Valley Conservation Authority ESA # 43 Niagara Escarpment Plan Area
Ownership:	Approximately 70% Public, 30% Private

\* Total number of plant species does not currently correspond with database

**Criteria Fulfilled**

**Primary Criteria**

- 1) Areas that exhibit relatively high native plant and/or animal species richness in the context of Halton Region.**

This area is reported to contain 403 native species of vascular plants (Webber 1983). This ranks third among Halton's ESAs in terms of plant species richness.

- 2) Areas that provide functional links among two or more adjacent natural systems.**

This ESA provides a linkage between Ballinafad Pond (ESA 33) to the west and Silver Creek Valley (ESA 32) to the east.

- 6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following nationally or provincially rare species are found within this ESA:

Ginseng (*Panax quinquefolius*)  
Red-shouldered Hawk (*Buteo lineatus*)  
Cerulean Warbler (*Dendroica cerulea*)

- 7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

Snow's Creek Woods ESA encompasses part of the Moffat Moraine (Pleistocene), as marked by a north-south trending ice contact face (Pleistocene) that stretches for approximately 2.5 km (Karrow 1987b). The ice contact deposits (Pleistocene) consist primarily of poorly sorted gravel. East of the moraine is a Silurian bedrock plain (Amabel Formation) (Telford et al. 1974) that has been covered by thin glacial drift (Pleistocene). Pockets of organic material (Recent) are found within the thin bedrock-drift complex (Karrow 1987b). The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

- 11) Areas that contribute significantly to maintaining surface water quality.**

The lowland areas along the southern portion of Snow's Creek Woods provide significant wetland storage (Ecologistics 1977).

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

The following regionally rare plant species have been found within this ESA:

Ebony Spleenwort (*Asplenium platyneuron*)  
Purple Avens (*Geum rivale*)  
One-sided Pyrola (*Orthilia secunda*)  
Black Spruce (*Picea mariana*)  
Small Northern Bog Orchis (*Platanthera obtusata*)  
Great Water Dock (*Rumex orbiculatus*)  
Prairie Willow (*Salix humilis*)  
Bog Goldenrod (*Solidago uliginosa*)  
Rock Elm (*Ulmus thomasii*)

**15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The Scotsdale Farm, which is owned by the Ontario Heritage Foundation, makes up a large portion of this ESA. This area is open to the public and includes a conference centre, making it suitable for scientific research and conservation education activities which are supported by the property's Management Plan.

**Sources of Information**

Abrey, N. 1975.  
Credit Valley Conservation Authority. 1985, 1992a (study area extends beyond ESA).  
Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977.  
Kaiser, J. 1984.  
Karrow, P.F. 1987b.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1983a, 1992a.  
Regional Municipality of Halton. 1978.  
Royal Botanical Gardens. 1977, 1981.  
Sutherland, D. 1981.  
Telford, P.G. et al. 1974.  
Webber, J. 1983.

**ESA 35: Terra Cotta Woods**

**General Description**

Terra Cotta Woods is situated on the top of the Niagara Escarpment and is dominated by exposed bedrock plains and shallow glaciofluvial gravels. The Niagara Escarpment, has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform. The greater part of the forested area is covered by oak, maple and birch. The valleys have slope forests of pine, hemlock and maple, and a deeply entrenched stream valley runs through the western end. A lowland swamp complex of elm-cedar forest and marshy meadows lies along the north-eastern boundary (EEAC 1978). A portion of this ESA is located within the provincially significant wetland complex, Caledon Mountain. The ESA also contains one provincially significant Life Science ANSI, Terra Cotta Forests.

The area is owned almost entirely by public agencies dedicated to its retention in a natural state. The major potential impact would appear to be overuse, along with the associated recreational facilities. Housing along the western and southern edges of this area could also result in disturbance to this ESA (EEAC 1978).

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 35

Size:	336 hectares
Plant Species (total #):	368
Plant communities:	Meadow Marsh (3.2) Southern White Cedar Swamp (3.6.2.2) Eastern Hemlock-Eastern White Cedar Swamp (3.6.2.7) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-American Beech (4.1.2.17) Eastern Hemlock-White Pine-Hardwood Forest (4.1.3.1) White Pine/Oak/Red Maple Forest (4.1.3.4) Late Successional Old Field (6.1.0.1)
Animal Species:	Herptiles: 13 Birds: 5(B), 27(P), 5(O) Mammals: 4 Fish: 6
Earth Science Features:	Escarpment Outwash Plain
Other Designations:	UNESCO MAB Reserve Provincially Significant Life Science ANSI Provincially Significant Wetland Complex Credit Valley Conservation Authority ESA # 23 Niagara Escarpment Plan Area
Ownership:	Largely Public

### Criteria Fulfilled

#### Primary Criteria

#### **6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The following nationally or provincially rare species have been identified within this ESA:

Jefferson Salamander (*Ambystoma jeffersonianum*)  
Jefferson/blue-spotted Salamander Complex (*Ambystoma jeffersonianum-laterale*)  
Louisiana Waterthrush (*Seiurus motacilla*)

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 35

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The Niagara Escarpment is a prominent feature within this ESA. The Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

**9) Areas that are determined to be significant groundwater discharge areas.**

This area has been identified as a very significant water storage area, with discharge to streams serving the Credit River system (Ecologistics 1977). The discharge flows from bedrock exposures along the escarpment and from within the steep dissected valley slopes (Ecologistics 1979).

### Secondary Criteria

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Yellow Giant Hyssop (*Agastache nepetoides*)  
Ebony Spleenwort (*Asplenium platyneuron*)  
Hawthorn (*Crataegus succulenta*)  
Matted Spike-rush (*Eleocharis intermedia*)  
Meadow Horsetail (*Equisetum pratense*)  
Woodland Horsetail (*Equisetum sylvaticum*)  
Star Duckweed (*Lemna trisulca*)  
One-flowered Pyrola (*Moneses uniflora*)  
Mexican Muhly (*Muhlenbergia mexicana* var. *filiformis*)  
Broadleaf Water-milfoil (*Myriophyllum heterophyllum*)  
White Water-lily (*Nymphaea odorata*)  
Bluegrass (*Poa alsodes*)  
Water Smartweed (*Polygonum amphibium*)  
Pondweed (*Potamogeton natans*)  
Pondweed (*Potamogeton nodosus*)

**15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The major part of this area is used by the Credit Valley Conservation Authority and the Peel Board of Education for outdoor education.

**Sources of Information**

Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977, 1979.  
Jakab, S., L. Densmore and S. Warren. 1980.  
Kaiser, J. 1984.  
Mullen, L., et al. 1982.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1988, 1991b, 1992a.  
Proctor & Redfern. 1982, 1983.  
Regional Municipality of Halton. 1978.  
Riley et al. 1996  
Royal Botanical Gardens. 1977, 1981.  
W. E. Coates and Associates Ltd. 1977.

**ESA 36: Georgetown Credit River Valley**

**General Description**

The Georgetown Credit River Valley is a major, undeveloped, wooded valley. The northern half of the valley is very deep and narrow and supports a fairly mature mixed forest, while further south the valley widens, and large open fields of hawthorn and apple are found. A red oak - sugar maple forest dominates the eastern plateau, and to the southwest there is a conifer plantation and a fairly mature maple-beech woodlot. The area has been designated a regionally significant life science ANSI (Gould 1989). The bedrock of the area is Queenston shale, buried 12-21 metres on the uplands but exposed in several reaches of the river.

The dumping of fill and waste materials has occurred in several locations along Armstrong Avenue on the west side of the valley. In addition, the Halton Hills sanitary landfill site intrudes into this valley near the railway tracks.

A large part of the ESA is owned by Upper Canada College, which has provided commendable stewardship through management and upgrading of this area. The remainder appears to be in private ownership, though a significant parcel is to be acquired by the Credit Valley Conservation Authority. The boundary reflects the agreements between EEAC, the Region of Halton, the Town of Halton Hills and Upper Canada College.



# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 36

Size:	220 hectares
Plant Species (total #):	< 100 species observed
Plant communities:	Shrub Rich Wet Meadow (3.2.0.5) Willow Thicket Swamp (3.6.1.2) Eastern White Cedar-Mixed Hardwood Swamp (3.6.4.3) Sugar Maple-American Beech Forest (4.1.2.17) Sugar Maple-Mixed Oak Forest (4.1.2.18) Eastern White Cedar-Hemlock-Mixed Hardwood (4.1.3.8) Late Successional Old Field (6.1.0.1) Conifer Plantation (7.3.1)
Animal Species:	Herptiles: No published information Birds: 49(B), 0(P), 111(O) Mammals: 7 Fish: 19
Earth Science Features:	Incised Valley
Other Designations:	Regionally Significant Life Science ANSI Credit Valley Conservation Authority ESA # 19
Ownership:	Public & Private (Upper Canada College)

### Criteria Fulfilled

#### Primary Criteria

#### 6) Areas that contain plant and/or animal species that are rare provincially or nationally.

The following provincially rare animal species have been identified within this ESA:

Southern Flying Squirrel (*Glaucomys volans*)  
Redside Dace (*Clinostomus elongatus*)

#### 9) Areas that are determined to be significant groundwater discharge areas.

There is evidence of groundwater discharge from both bedrock and overburden aquifers within this ESA (Ecologistics 1977).

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The well-wooded valley assists in the maintenance of high quality water in the Credit River, which is an important spawning area for salmonids from Lake Ontario. The ESA also facilitates natural floodplain storage which again functions to maintain high quality water in the Credit River (Ecologistics 1979).

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plant species:

Giant Ragweed (*Ambrosia trifida*)  
Common Juniper (*Juniperus communis*)  
Late Goldenrod (*Solidago gigantea*)  
White Goldenrod (*Solidago hispida*)

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

River Drive provides an excellent view of the deep and heavily wooded valley to the north. The wide southern valley with the forested hillsides and open hawthorn fields can be seen from Upper Canada College Nature School lookout. These lookout points, combined with the rich and beautiful character of this valley give it a high aesthetic value (EEAC 1978).

**15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

This valley is used extensively by Upper Canada College Nature School. The area, with its high habitat diversity, is well suited for educational purposes (EEAC 1978).

**Sources of Information**

Crins, W.J. 1986.  
Ecological and Environmental Advisory Committee. 1978.  
Ecologistics Ltd. 1977, 1979, 1988b.  
Gould, J. 1989.  
Johnston, S. and R. Vintuks. 1985.  
Kaiser, J. 1984.

# HALTON REGION

## Environmentally Sensitive Areas Update

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ESA N° 36

Ontario Ministry of Natural Resources. 1976a, 1976b, 1988, 1991b.  
Regional Municipality of Halton. 1978.  
Royal Botanical Gardens. 1977, 1981.

## **ESA 37: Hungry Hollow Ravine**

### **General Description**

Hungry Hollow Ravine consists of a deep valley with several tributary streams which flow into the Credit River. The rich, fern-clad banks and periodic wet areas supporting huge willow trees contrast sharply with the drier fields. The valley walls support a mature mixed forest of sugar maple, beech, eastern hemlock and white cedar. The floodplain supports an extensive stand of cedar with a lush herbaceous layer along the river (EEAC 1978). The ESA is included within the provincially significant Hungry Hollow wetland complex.

The area northeast of this ESA has already been developed for residential use, and further developments to the south of the ravine have been built. The Georgetown Sewage Treatment Plant is located in this ESA and has been expanded, destroying part of the floodplain and causing damage to the stream. Current activities in this ESA include the twinning of the Silver Creek Trunk sewer and the widening of Mountainview Road.

Parts of Hungry Hollow Ravine have suffered significant damage to trees, understory and soils from vandalism and the use of trail bikes. These activities reduce the quality of the natural features and impair its enjoyment by area residents. The majority of this ESA is privately owned (EEAC 1978).

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 37

Size:	193 hectares
Plant Species (total #):	323*
Plant communities:	Cattail Marsh (3.1.1.1) Shrub Rich Wet Meadow (3.2.0.5) Southern White Cedar Swamp (3.6.2.2) Silver Maple Swamp (3.6.3.3) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Eastern Hemlock-Mixed Hardwood Forest (4.1.3.3) Hawthorn Thicket (4.2.0.4) Late Successional Old Field (6.1.0.1)
Animal Species:	Herptiles: 8 Birds: 42(B), 0(P), 35(O) Mammals: 10 Fish: 14
Earth Science Features:	Meltwater Channel
Other Designations:	Provincially Significant Wetland Complex Credit Valley Conservation Authority ESA # 20
Ownership:	Largely Private

\* Total number of plant species does not currently correspond with database

### Criteria Fulfilled

#### Primary Criteria

**5) Areas that contain remnant native plant communities that are rare within Halton Region or that are not represented in other ESAs.**

A fen community exists within this ESA. Fens are considered to be rare plant communities whenever they occur south of the Canadian Shield (Riley 1989b).

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

This ESA contains the following provincially rare species:

Finely-pilose Evening-primrose (*Oenothera pilosella* ssp. *pilosella*)

Atlantic Salmon (*Salmo salar*)

**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The riparian vegetation in this valley system helps ameliorate surface water temperatures in tributaries of the Credit River. The ravine also provides floodplain storage which further preserves the water quality of the Credit River (Ecologistics 1979).

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Giant Ragweed (*Ambrosia trifida*)  
Heath Aster (*Aster ericoides*)  
Aquatic Sedge (*Carex aquatilis*)  
Dutchman's Breeches (*Dicentra cucullaria*)  
Meadow Horsetail (*Equisetum pratense*)  
Woodland Horsetail (*Equisetum sylvaticum*)  
Variegated Horsetail (*Equisetum variegatum*)  
Purple Avens (*Geum rivale*)  
Eastern Red Cedar (*Juniperus virginiana*)  
Spiked Water-milfoil (*Myriophyllum sibiricum*)  
Finely-pilose Evening-primrose (*Oenothera pilosella* ssp. *pilosella*)  
Smooth Gooseberry (*Ribes hirtellum*)  
Swamp Rose (*Rosa palustris*)  
Bulrush (*Scirpus microcarpus*)  
Bog Goldenrod (*Solidago uliginosa*)  
Common Bur-reed (*Sparganium eurycarpum*)  
Drooping Ladies Tresses (*Spiranthes cernua*)  
New York Fern (*Thelypteris noveboracensis*)  
Smooth Highbush Blueberry (*Vaccinium corymbosum*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

The wooded areas of the Hungry Hollow Ravine are of very high quality. There are excellent examples of mature Sugar Maple forests and mixed forests. Silver Creek is a good quality aquatic community, especially north of the sewage treatment plant, and serves as a feeding ground for populations of Belted Kingfisher (*Megaceryle alcyon*), Green Heron (*Butorides virescens*), and Great Blue Heron (*Ardea herodias*) (EEAC 1978).

**14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The high quality woodlands and floodplain, combined with scenic views of the surrounding landscape, give this area a high aesthetic value, and provide visual relief from urbanization to the east (EEAC 1978).

**Sources of Information**

Crins, W.J. 1986.

Ecological and Environmental Advisory Committee. 1978.

Ecological Services for Planning Ltd. 1979.

Ecologistics Ltd. 1979, 1988c.

Hanna, R. 1984.

Kaiser, J. 1984.

Marshall Macklin Monaghan Ltd. (in association with J.E. Hanna Associates Ltd.). 1990.

Ontario Ministry of Natural Resources. 1976a, 1976b.

Parker Consultants. 1989b, 1990b.

Regional Municipality of Halton. 1978.

Royal Botanical Gardens. 1977, 1981.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 38

### ESA 38: Ballinafad Esker

#### General Description

The relatively small area included in this ESA encompasses a ridge of poorly to moderately sorted ice contact sands and gravels known as the Ballinafad Esker (Karrow 1987b). This earth science feature originated as a glacial meltwater channel which formed within the Late Wisconsin ice sheet (Pleistocene). As the ice retreated to the southeast, the sands and gravels deposited in the channel of the glacier stream were draped onto the land surface forming a long, narrow ridge. This is one of only three such features known to occur within the Region of Halton. The others lie near the Halton - Wellington Boundary, on either side of the Blue Springs Creek Valley ESA (Karrow 1968). The area is situated within the boundaries of the provincially significant Acton Silver Creek wetland complex. The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

The small area is presently used as pasture and is largely grassland (EEAC 1978). The site is privately owned and accessible for viewing only by permission of the owner. The greatest threat is its potential use for gravel extraction, a use which has destroyed many eskers in southern Ontario (EEAC 1978).

Size:	22 hectares
Plant Species (total #):	< 100 species observed
Plant communities:	No published information
Animal Species:	Herptiles: No published information Birds: No published information Mammals: No published information Fish: 3
Earth Science Features:	Esker
Other Designations:	UNESCO MAB Reserve Provincially Significant Wetland Complex Niagara Escarpment Plan Area
Ownership:	Private



### Criteria Fulfilled

#### Primary Criteria

- 7) **Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

Ballinafad Esker is a textbook example of a glacial deposit laid down during the last ice age. The typical esker ridge morphology is particularly well displayed. Although other less clearly defined eskers exist within the Region, this feature is the only remaining esker within the entire Niagara Escarpment Plan Area (EEAC 1978, [editor's note: the original reference (EEAC 1978) was to the entire NEC Planning Area, however, esker-like ridges southwest of Tobermory have since been identified by the Bruce Peninsula National Park geomorphological inventory study). The Niagara Escarpment has been designated a biosphere reserve by the UNESCO Man and the Biosphere Program, hence, this ESA is part of an internationally significant landform.

#### Secondary Criteria

- 15) **The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

Because of the nature of the pasture vegetation, this esker is readily visible and potentially important for educational purposes in the Region. In addition, the associated gravel pit provides an opportunity to observe the internal structure and composition of the landform.

#### Sources of Information

Ecological and Environmental Advisory Committee. 1978.  
Hanna, R. 1984.  
Kaiser, J. 1984.  
Karrow, P.F. 1968, 1987b.  
Ontario Ministry of Natural Resources. 1976a, 1976b, 1992a.  
Regional Municipality of Halton. 1978.  
Royal Botanical Gardens. 1981.

**ESA 39: Paris Moraine Complex**

**General Description**

The Paris Moraine is formed from sandy Wentworth Till. It represents a major end position of the ice front during its final retreat from the area and immediately following the Port Bruce Stadial (advance) which occurred approximately 14,000 to 15,000 years Before Present (OMNR 1983a). The topography in this area is very broken, having at least 30 m of relief. The landform consists of distinct hummocks and large conical-shaped hills typical of end moraines and associated ice-contact disintegration features (kame deposits).

The area of the ESA incorporates several woodlots, but consists mostly of rural residential and agricultural land uses. The coarse-textured soils are not suitable for intensive agriculture and, as a result, most of the farming involves improved and unimproved pasture.

The area does not incorporate a large component of natural vegetation, and hence, does not have the same degree of sensitivity as most other ESAs, although part of it is within the boundaries of the provincially significant Arkell-Corwhin wetland complex. The area has already been developed in the form of low intensity agriculture and every attempt should be made to maintain this land use. In a sense, much of the value of the ESA lies in the lack of extensive forest tracts which, if present, would obscure the otherwise excellent visual display of the morphology associated with this landform. Any developments which require large scale regrading should be prevented.

Size:	184 hectares
Plant Species (total #):	< 100 species observed
Plant communities:	No published information
Animal Species:	No published information
Earth Science Features:	Moraine
Other Designations:	Provincially Significant Wetland Complex
Ownership:	Private

**Criteria Fulfilled**

**Primary Criteria**

- 7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

This ESA has been selected as the best example of morainal topography representing a major end moraine of the 'Horseshoe Moraine' complex of south-central Ontario. A portion of this moraine, lying immediately southwest of this location in Wellington County, has been designated as a provincially significant Earth Science ANSI (OMNR 1983a). Although outside of the ANSI area, the Paris Moraine is particularly well displayed within this ESA and is comparable in its expression to that occurring within the ANSI immediately adjacent (but outside Halton).

- 8) Areas that are determined to contribute significantly to local and/or regional groundwater recharge.**

Although the groundwater flow regime in this area has not been quantitatively evaluated, the large size of the ESA, in combination with the presence of deep, coarse-textured soils, would result in significant local groundwater recharge (Cowell, pers. obs. 1992). Groundwater from this complex likely recharges Blue Springs Creek and the Eramosa River.

**Secondary Criteria**

- 14) Areas that are recognized as highly aesthetic themselves or that provide designated viewpoints.**

The rolling to broken pastoral setting is aesthetically pleasing. Due to the high relief of the moraine relative to Blue Springs Creek and areas to the south, broad vistas are presented. Several excellent vantage points occur along First Line.

- 15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The hummocky topography offers a textbook example of late glacial ice disintegration kame landforms. The high, linear northeast - southwest trending ridge is clearly visible and marks the location of the ice front immediately following the Port Bruce Stadal.

**Sources of Information**

Karrow, P.F. 1968.

Ontario Ministry of Natural Resources. 1983a.

## **ESA 40: Joshua's Creek Pop-Up**

### **General Description**

The Joshua's Creek pop-up is a structural geological feature which occurs within the Georgian Bay Formation (Paleozoic). It appears as a sharp-crested fold in interbedded shales and siltstones in the east bank of Joshua's Creek. The total size of the pop-up is approximately 2m in height (from water level to top of bank) and 3.5 m wide. It is actively eroded during high flow periods in the creek. The area outlined by this ESA includes the pop-up as well as numerous fossiliferous exposures of bedrock and the transition between the Georgian Bay and Queenston Formations.

The pop-up is actually a fold in the rock created by horizontally exerted pressures. Such structural features are rare in the bedrock of Halton as there has been very little tectonic activity in this area. The actual time of formation of the feature is not known except that it occurred after the clay and silt were consolidated into sedimentary shales and siltstones. Its occurrence near the ground surface and the recent observation of several similar features in southern Ontario have led researchers to believe these features are quite recent in formation. They may have been caused by the removal of overlying rock or due to melting of the Wisconsin glacier. Either case would result in a relatively sudden release of pressure. This could be sufficient to cause the surficial bedrock layers to 'pop-up' in the form of small folds.

The Georgian Bay Formation is Upper Ordovician in age (approximately 450 million years). It consists of blue and grey shale with some limestone and siltstone interbeds. The siltstone and limestone layers are harder than the shale beds and tend to protrude from exposed faces as the shales are preferentially removed. The contact with the Upper Ordovician Queenston Formation, which is younger and lies stratigraphically above the Georgian Bay Formation, also occurs within this ESA. The typical red shale and siltstone layers of the Queenston are visible along Joshua's Creek intermixed with the greenish-grey beds typical of the Georgian Bay Formation. Numerous fossils, worm burrows, mud casts and ripple marks are visible in the exposures and in fragments occurring along the creek bed. The pattern of erosion by the creek is controlled by the relative difference in hardness between siltstone and shale beds. The former are more resistant resulting in the formation of a series of small riffles interspersed with flatter stretches and pools.

The Joshua's Creek pop-up is considered to be provincially significant by the Ontario Geological Survey (Weninger and Cordiner 1987) and has been designated a provincially significant Earth Science ANSI.

Joshua's Creek is an urbanized stream, development has encroached on both sides and the remaining vegetation is composed of a high proportion of non-native species.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 40

The vegetated slopes of Joshua's Creek continue to provide natural cover and assist in preventing erosion. The proximity to a road and the lack of sensitive natural features make this area an ideal candidate for school field trips.

Size:	9 hectares
Plant Species (total #):	< 100 species observed
Plant communities:	No published information
Animal Species:	Herptiles: No published information Birds: No published information Mammals: No published information Fish: 7
Earth Science Features:	Ice Release Feature (bedrock pop-up) Bedrock Structural Feature (fold)
Other Designations:	Provincially Significant Earth Science ANSI Parkway Belt West
Ownership:	Private

### Criteria Fulfilled

#### Primary Criteria

- 7) **Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The pop-up is a fold in the rock created by pressures exerted horizontally. Such structural features are rare in the bedrock of Halton and this particular feature is considered by the Ontario Geological Survey as being provincially significant (Weninger and Cordiner 1987). It was described by Karrow (1987a) who provides a photograph of the pop-up. This feature has also been designated as a provincially significant Earth Science ANSI by the OMNR (OMNR 1991a).

**Secondary Criteria**

- 15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The close proximity of Joshua's Creek Pop-up ESA to several schools and a university, makes the area easily accessible for students wishing to conduct field studies. In addition, scientific research has been stimulated by the occurrence of pop-ups such as that at Joshua's Creek.

**Sources of Information**

Karrow, P.F. 1987a.  
Marshall Macklin Monaghan Ltd. and LGL Research Associates. 1991  
Ontario Geological Survey Map 2336.  
Ontario Ministry of Natural Resources 1991a.  
Weninger, J.M. and G.S. Cordiner. 1987.

**ESA 41: Stewarttown Woods**

**General Description**

Stewarttown Woods contains Black Creek and its floodplain and an area above the valley to the east. The valley floor consists of imperfectly-drained Brady sandy loam. Above the valley, the soils are well-drained Grimsby sandy loams. The valley walls are steep with a high potential for erosion and soil creep is active on parts of the valley wall. Groundwater discharge into Black Creek occurs within the ESA.

The vegetation of Stewarttown Woods consists of several plant associations including young sugar maple - white ash - white birch, mature hemlock - beech - sugar maple, and a white cedar - hemlock - mountain maple swamp. Meadows and open floodplain areas are located along the creek within the ESA (Ecologistics 1979).

Portions of the valley bottom are presently being encroached upon by agriculture and the use of a farm lane for public access to adjacent strawberry fields.

Size:	32 hectares
Plant Species (total #):	230*
Plant communities:	No published information
Animal Species:	Herptiles: 2 Birds: 34 (B), 13 (P), 2 (O) Mammals: 8 Fish: 8
Earth Science Features:	No published information
Other Designations:	Credit Valley Conservation Authority ESA # 18 Niagara Escarpment Planning Area
Ownership:	Private

\* Total number of plant species does not currently correspond with database

**Criteria Fulfilled**

**Primary Criteria**

**9) Areas that are determined to be significant groundwater discharge areas.**

This area has been determined to discharge into Black Creek (Ecologistics 1979).



**11) Areas that contribute significantly to maintaining surface water quality and quantity.**

The wooded floodplain of Black Creek contributes to maintaining surface water quality by providing shade for the creek, which prevents increased water temperatures. The woods also function in a flood storage capacity, further protecting the water quality of the creek (Ecologistics 1979).

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Giant Ragweed (*Ambrosia trifida*)

Eastern Red Cedar (*Juniperus virginiana*)

Running Club-moss (*Lycopodium clavatum*)

**13) Areas that contain high quality assemblages of native plant and/or animal species.**

The mature hemlock - beech - sugar maple community shows little sign of disturbance with good regeneration of the native overstorey.

**Sources of Information**

Credit Valley Conservation Authority. Undated.  
Ecologistics Ltd. 1979, 1991.

**ESA 42: New Acton Swamp**

**General Description**

The New Acton Swamp ESA is a part of the Acton-Silver Creek provincially significant wetland complex evaluated by the OMNR in 1984. The area includes the Credit River Conservation ESAs 45, 46 and 47. This large, low lying site is characterized by lowland forests and swamps. Typical species occurring in lowland forest associations include Eastern white cedar, American elm, balsam fir, silver maple, red maple, white ash, black ash, white birch, yellow birch and willow species. The often chaotic appearance of Acton Swamp is due to a combination of shallowly rooted trees which are blown over, small water-filled surface depressions and a predominance of tall shrubs. This appearance is important as it provides a variety of micro-habitats in swamps ranging from open-water to dry micro-sites on the fallen logs.

Taken in total, Acton Swamp is a large, diverse environment. In addition to lowland forests, there are thickets, marshes, open water, riparian and upland communities represented. Farming practices in the vicinity of this ESA are currently having an adverse impact on water quality and native vegetation. Cattle were observed free roaming in swamps and creek beds.

Size:	Candidate Site
Plant Species (total #):	>100
Plant Communities:	No published information
Animal Species:	No published information
Other designations:	Provincially Significant Wetland Complex Credit Valley Conservation ESAs #45,46,47
Ownership:	Private

**Criteria Fulfilled**

**Primary Criteria**

- 4) Areas that contain (in a regional context), relatively undisturbed expanses of natural, native plant communities, in particular those that support interior forest conditions.**

Although this ESA is dissected by farmland and secondary roads, the extent of undeveloped, interconnected wetland is regionally significant.

**11) Areas that contribute to maintaining surface water quality and quantity.**

The extensive vegetation cover and organic soils maintain cool water conditions and filters surface water in the numerous creeks flowing into Black Creek.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Meadow Horsetail (*Equisetum pratense*)

Black Spruce (*Picea mariana*)

Northern Dewberry (*Rubus flagellaris*)

**Recommendation**

It is recommended that the New Acton Swamp be included as ESAs in the Region of Halton and the provincial ANSI boundary be adopted as the ESA boundary for these features.

**Sources of Information**

Credit Valley Conservation (open files)

Ecologistics Ltd. 1977, 1979.

Landplan. 1990.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 43

### ESA 43: Drumquin Woods

#### General Description

Drumquin Woods ESA encompasses a glaciolacustrine beach ridge and associated nearshore sand deposits of the Peel Ponding (Pleistocene). It overlies the Halton Till Plain but rather than clay till, is composed of deep well-sorted very fine sands and silts. This explains the presence of numerous tree and shrub nurseries in this area. The sands are exposed in the banks of the small tributary to Sixteen Mile Creek which forms the southern boundary of the ESA. The beach ridge landform within the southeastern portion of the ESA forms part of a long ridge complex which trends to the north and northwest toward Egerton. Immediately south of Egerton the ridge grades into a glaciolacustrine delta, which formed where the early Sixteen Mile Creek drained into Lake Peel (Karrow 1987b). The sands located within the Drumquin Woods ESA likely represent re-worked deltaic deposits formed in association with the beach ridge complex to the east.

A portion of the sand deposit is wooded. The major part of the forest is a swamp dominated by large silver maple, some of which have attained girths of 110-120 cm DBH. This swamp is an uncommon vegetation type on the Peel Plain. In areas of better drainage, such as along the wooded section of the terrace adjacent to the small tributary to Sixteen Mile Creek, upland species such as red oak, American beech, white ash, black cherry and hop hornbeam occur.

Impacts along the western edge include a laneway which extends into the woods and some dumping of refuse. Several large, hemispherical holes suggest that live trees have been removed from this woods.

Size:	101 hectares
Plant Species (total #):	< 100 species observed *
Plant communities:	No published Information
Animal Species:	Herptiles: 7 Birds: 18(B), 11(P), 0(O) Mammals: 4 Fish: 13
Earth Science Features:	Peel Ponding Aeolian (loess)
Other Designations:	None
Ownership:	Private

\* Total number of plant species does not currently correspond with database

**Criteria Fulfilled**

**Primary Criteria**

- 7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

This area provides Halton's best representation of glaciolacustrine shoreline and nearshore deposits associated with the Peel Ponding.

- 11) Areas that contribute significantly to maintaining surface water quality and quantity.**

Drumquin Woods is drained by Sixteen Mile Creek. The wet woods holds water and slowly releases it, thereby contributing to surface water quality.

**Secondary Criteria**

- 12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Groundnut (*Apios americana*)  
Skunk Currant (*Ribes glandulosum*)  
Northern Dewberry (*Rubus flagellaris*)  
Great Water Dock (*Rumex orbiculatus*)

- 13) Areas that contain high quality assemblages of native plant and/or animal species.**

The silver maple swamp, which dominates much of the wooded part of this ESA, contains some large, high quality trees. The swamp is relatively undisturbed.

**Sources of Information**

Karrow, P.F. 1987b.  
McIlwrick, K. 1994.

**ESA 44: Brookville Drumlin Field**

**General Description**

Drumlin fields consist of elongated hills composed mostly of non-sorted till separated by a flat, usually poorly-drained till plain (Pleistocene). These areas are characteristically swampy due to the presence of the drumlins which inhibit the formation of stream channels. The drumlins were deposited as the ice advanced over the area, prior to the development of the Paris and Galt Moraines. They are composed of sandy Wentworth Till and were partially over-ridden by the ice when it constructed the Moffat Moraine (Karrow 1968). The drumlin field is located within the boundaries of the Halton Escarpment provincially significant wetland complex.

The area does not incorporate a large component of natural vegetation, and hence, does not have the same degree of sensitivity as most other ESAs. The area has already been developed in the form of low intensity agriculture, although portions of the area are old field habitats. Any developments which require large scale re-grading should be prevented.

Size:	138 hectares
Plant Species (total #):	< 100 species observed
Plant communities:	No published information
Animal Species:	Herptiles: No published information Birds: No published information Mammals: No published information Fish: 4
Earth Science Features:	Drumlins
Other Designations:	Provincially Significant Wetland Complex
Ownership:	Private

**Criteria Fulfilled**

**Primary Criteria**

- 7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The earth science criterion is met by this ESA as it provides the best representation within the Region of Halton of a drumlin field and well developed drumlin landforms.

These features are rare in the Region of Halton, occurring only in the small drumlin field located around Brookville.

**Secondary Criteria**

- 15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The drumlins are particularly well displayed, illustrating the typical lee and stoss morphology indicative of the direction of ice flow. The presence of the Moffat Moraine overlying the drumlin field is of great interpretive value.

**Sources of Information**

Karrow, P.F. 1968.

## **ESA 45: Galt and Moffat Moraines**

### **General Description**

The Galt and Moffat Moraines (Pleistocene) has been recommended as a provincially significant Earth Science ANSI (OMNR 1983). This area, along with portions of the Paris moraine to the west in Wellington County, is considered by Dr. Karrow to offer the best example of morainal topography associated with the 'Horseshoe Moraine' complex of south-central Ontario.

Both moraines are formed from the sandy Wentworth Till. They represent two distinct standstill positions of the ice front during its final retreat from the area and immediately following the formation of the Paris Moraine (approximately 14,000 to 15,000 years Before Present, Ontario MN 1983). The Moffat Moraine is much smaller and less continuous than the Galt Moraine which probably reflects a shorter standstill at the position of the Moffat Moraine. Between the two moraines lies a low wetland area with exposed bedrock. This wetland originally formed part of a meltwater channel which drained the ice as it began to withdraw from the position of the Moffat Moraine. The hummocky, conical-shaped hills typical of end moraines and associated ice-contact disintegration features (kame deposits) are particularly well displayed in this ESA.

The ESA incorporates one large woodlot, however, the area consists mostly of rural residential and agricultural land uses. The coarse textured soils are not suitable for intensive agriculture and, as a result, most of the farming involved improved and non-improved pasture.

The boundaries of the Galt and Moffat Moraines ESA are the same as those previously designated a provincially significant Earth Science ANSI (OMNR 1983). As in the case of the Paris Moraine ESA (ESA No. 39), the area does not incorporate a large component of natural vegetation and, hence, does not have the same degree of sensitivity as most other ESAs. However, the area is located within the boundaries of two provincially significant wetland complexes, the Badenoch-Moffat and the Guelph Junction wetlands. The area is currently used for low intensity agriculture and every attempt should be made to maintain this land use. The value of the ESA is enhanced by the lack of extensive forest cover, which, if present, would obscure the otherwise excellent visual display of the morphology associated with this landform. Any developments which require large scale regrading should be prevented.



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## Environmentally Sensitive Areas Update

ESA N° 45

Size:	616 hectares
Plant Species (total #):	No published information
Plant Communities:	No published information
Animal Species:	Herptiles: No published information Birds: No published information Mammals: No published information Fish: 9
Other designations:	Provincially Significant Earth Science ANSI 2 Provincially Significant Wetland Complexes
Ownership:	Private

### Criteria Fulfilled

#### Primary Criteria

- 7) **Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

This area is considered to be the best example of the Galt and Moffat Moraines anywhere in Ontario and, as such, have been designated as provincially significant. The Hamlet of Moffat is the Type Location for which the moraine has been named. The intervening wetland complex provides representation of meltwater processes as the ice front withdrew from the area.

- 8) **Areas that are determined to contribute significantly to local and/or regional groundwater recharge.**

Although the groundwater flow regime in this area has not been evaluated quantitatively, its large size in combination with the presence of thick, coarse textured soils would likely result in significant local groundwater recharge. Groundwater from this complex likely recharges to both Blue Springs Creek and Bronte Creek as the Galt Moraine forms the surface drainage divide between the Lake Erie and Lake Ontario watersheds.

**Secondary Criteria**

- 15) The location of the area, combined with its natural features, make it particularly suitable for scientific research and conservation education purposes.**

The hummocky topography and distinct morainal complexes of this ESA are readily visible and accessible by road, and thus it offers an excellent opportunity for conservation education purposes.

The area's close proximity to other ESAs having significant earth science features representing a range of glacial landforms and process (moraines, drumlins, meltwater channels, etc.), also makes this area particularly suitable for interpretative and educational purposes. Scientifically, the designation of this area as being the best expression of these two moraines signifies their value as a 'Type Section'.

**Recommendation**

It is recommended that the Galt and Moffat Moraines be included as ESAs in the Region of Halton and the provincial ANSI boundary be adopted as the ESA boundary for these features.

**Sources of Information**

Karrow, P.F. 1968.  
Ontario Ministry of Natural Resources. 1983.

## **ESA 46: Burlington Beach**

### **General Description**

Burlington Beach, located on the Lake Ontario side of the Hamilton Harbour Baymouth bar provides representation of the largest Baymouth bar (lacustrine post-glacial to present) in Ontario, active sand dunes (Aeolian), and an active nearshore/beach complex (lacustrine). Although the area has been highly impacted in the past. A number of these have been fully or partially reversed, particularly through the removal of many of the former houses/cottages which occupied the dune area.

As a result, Aeolian processes are becoming re-established and dune formation has been reactivated. This is particularly evident in the area north of the pipeline and south of the public access boardwalk. Inclusion within the ESA of the nearshore/beach is also warranted since, despite the presence of the canal structures (to the south) and shoreline hardening activities (upcurrent to the east), the beach has been maintained and the process of beach formation continues. Within the context of Halton, it certainly represents the best examples of these features and processes as well as providing excellent representation of the Baymouth bar feature itself.

One nationally/provincially rare plant has been reported from Burlington Beach, Narrow-leaved Puccoon (*Lithospermum incisum*). Collections for this species date from June 1, 1889 (Burlington Beach sandy thicket) and June 1893 (Burlington Beach between piers and Brant House, near the channel). Argus et al. (1982-1987) include a post-1964 record, this being a 1978 collection from the Hamilton-Wentworth portion of Burlington Beach (Counsil pers. comm., 1992). Several other plants: beach grass (*Ammophila breviligulata*) (which has been planted, presumably for its sand stabilizing qualities), nut-grass (*Cyperus schweinitzii*) and sand-grass (*Triplasis purpurea*) (Axon pers. comm. 1992-93), are considered regionally rare.

Although constituting an ESA, natural processes should be further enhanced by continued restoration of the dune areas. This will require the removal of old lawns associated with former houses. In addition, the planted non-native vegetation should be removed and replaced by native dune species in order to cultivate true dune processes as well as minimize sand encroachment on paths and roads to the west.

# HALTON REGION

## Environmentally Sensitive Areas Update

ESA N° 46

Size:	11 hectares
Plant Species (total #) :	235
Plant Communities:	Mixed Shrub Thicket (4.2.0.2) Sandy Beach Strand (4.7.1.1) Low Stabilized Dunes (4.7.2.3)
Animal Species:	Herptiles: No published information Birds: No published information Mammals: No published information Fish: 14
Other designations:	None
Ownership:	Public and Private

### Criteria Fulfilled

#### Primary Criteria

**6) Areas that contain plant and/or animal species that are rare provincially or nationally.**

The provincially rare plant species narrow-leaved puccoon (*Lithospermum incisum*) has been historically documented from Burlington Beach and was documented post-1964 from the Hamilton-Wentworth portion of the beach (Geomatix 1993). Two additional species documented by Axon (1989) are also considered provincially rare. These species are Schweinitz's flatsedge (*Cyperus schweinitzii*) and purple love grass (*Eragrostis spectabilis*).

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The ESA designation is based on the presence of Ontario's largest Baymouth bar landform; Aeolian processes and active sand dunes; active longshore lacustrine processes and beach formation.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Heath Aster (*Aster ericoides*)  
American Sea-rocket (*Cakile edentula*)  
Sedge (*Carex lanuginosa*)  
Long-spine Sandbur (*Cenchrus longispinus*)  
Eyebane Broomspurge (*Chamaesyce nutans*)  
Seaside Spurge (*Chamaesyce polygonifolia*)  
Hawthorn (*Crataegus calpodendron*)  
Winged Pigweed (*Cycloloma atriplicifolium*)  
Umbrella Sedge (*Cyperus strigosus*)  
Smooth Scouring Rush (*Equisetum laevigatum*)  
Variegated Horsetail (*Equisetum variegatum*)  
False Dragonhead (*Physostegia virginiana*)  
Smartweed (*Polygonum punctatum*)  
Black Willow (*Salix nigra*)  
Common Three-square (*Scirpus pungens*)  
Bur Cucumber (*Sicyos angulatus*)  
Late Goldenrod (*Solidago gigantea*)  
Sand Dropseed (*Sporobolus cryptandrus*)  
Wood Sage (*Teucrium canadense* ssp. *canadense*)

**Recommendation**

Burlington Beach (especially the central and southern portions ) is recommended for ESA designation.

Although recommended as an ESA, the site would be enhanced by further restoration of the dune areas. This will require the removal of old lawns associated with former houses. In addition, the planted non-native vegetation should be removed and replaced by native dune species in order to cultivate true dune processes as well as minimize sand encroachment on paths and roads to the west.

**Sources of Information**

Axon, B. 1989.  
Diamond et al. 1994.

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## Environmentally Sensitive Areas Update

ESA N° 47

### ESA 47: Black Creek at Acton

#### General Description

This ESA is a part of the Black Creek at Acton wetland complex. The area includes the Credit Valley Conservation ESA 61. This ESA is composed of the valley and adjacent uplands of Black Creek between the towns of Acton and Limehouse. The uplands are composed of a mixture of deciduous forests as well as old fields and shrub thickets. The valley slopes and higher portions of the floodplain contain immature lowland deciduous forests. The creek valley contains a variety of marsh and swamp communities throughout its length.

There is extensive development in the vicinity of this site. Urban development is present to the north associated with Acton as well as a wastewater treatment plant in the northeast portion of the site. In addition, two quarries are present, adjacent to the south and east wetland boundaries. It is thought that the proximity of the quarries could potentially have an effect on the local hydrologic regime.

Size:	205 hectares
Plant Species (total #) :	244
Plant Communities:	Cattail Marsh (3.1.1.1) Reed Marsh (3.1.1.2) Forb Rich Wet Meadow (3.2.0.4) Thicket Swamp (3.6.1) Broadleaf Forest Swamp (3.6.3) Southern White Cedar Swamp (3.6.2.2) Green Ash-Red Ash Forest (4.1.2.7) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Trembling Aspen Successional Forest (4.1.2.29) Shrub Thicket (4.2) Old Field (7.1)
Animal Species:	Herptiles: 2 Birds: 0(B), 0(P), 50(O) Mammals: 5
Other designations:	Locally Significant Wetland Complex Credit Valley Conservation ESA #61
Ownership:	Private

**Criteria Fulfilled**

**Primary Criteria**

**2) Areas that provide functional links among two or more adjacent systems.**

Black Creek provides potential connections among the following ESAs west to Fairy Lake Marsh (ESA 27), south to Acton Swamp (ESA 28) and east to Waterfall Woods (ESA 30), utilizing adjacent agricultural fields and woodlots.

**11) Areas that contribute to maintaining surface water quality and quantity.**

The riparian wetlands along this portion of Black Creek and the wooded swamps likely contribute to surface water quality. It would be helpful to determine if there is a concern with water pollution from the old Beardmore Tanenry to the west, the wastewater treatment facility or the quarries adjacent to the site.

Black Creek at Acton could also possibly fulfill Criteria 1 (high native plant species richness) with additional fieldwork or documentation.

**Secondary Criteria**

**12) Areas that contain regionally rare plants.**

This ESA contains the following regionally rare plants:

Cow-parsnip (*Heracleum lanatum*)  
Star Duckweed (*Lemna trisulca*)  
Interrupted Fern (*Osmunda claytoniana*)  
True Wood-sorrel (*Oxalis acetosella* ssp. *montana*)  
Virginia Creeper (*Parthenocissus quinquefolia*)  
Black Spruce (*Picea mariana*)  
Bulrush (*Scirpus microcarpus*)  
Common Bur-reed (*Sparganium eurycarpum*)  
Skunk Cabbage (*Symplocarpus foetidus*)

**Recommendation**

It is recommended that Black Creek at Acton be included as an ESA in the Region of Halton.

**Sources of Information**

Credit Valley Conservation (open files)  
Ecologistics Ltd. 1977.  
OMNR 1998.



## **ESA 48: Trafalgar Moraine**

### **General Description**

The Trafalgar Moraine ESA consists of two separate sections: Trafalgar Moraine West and Trafalgar Moraine East. The boundaries of the ESA conform to the boundaries of the OMNR Earth Science ANSI of the same name. Three distinct morphologies of the Trafalgar Moraine are displayed in the ESA including: fluted till with the moraine crest preserved; a ridged smooth till moraine and a ridged, slightly hummocky till moraine east of the Sixteen Mile Creek.

The Trafalgar Moraine West portion extends westward from the Sixteen Mile Creek ESA (also known as Oakville Creek) to west of Tremaine Road. The western half of this section of the ESA contains a fluted moraine morphology whereas the eastern half is smooth and defined by a boundary to the east, a major flute to the west, and the dominant break of slope to the north. The southern boundary includes the dominant break of slope but has been extended in the western half to incorporate more of the deep fluted morphology.

The Trafalgar Moraine East portion extends from approximately Trafalgar Road (just north of the small hamlet of Trafalgar which gives the moraine its name) westward toward 4th Line. The moraine in this area displays a prominent central crest with a weak hummocky morphology on either side of the ridge crest. The low hummocks are interspersed with shallow but distinct depressions, likely small kettle features. Trafalgar Moraine East is bounded by the new Highway 407 alignment to the north, Trafalgar Road to the east, and the dominant break of slope in the south. The southern boundary cuts diagonally across the moraine from where the moraine crest meets Highway 407 and Trafalgar Road, to the Neyagawa Interchange in the west.

The fluted till morphology is particularly interesting since one would normally associate fluting with glacial advance ground moraine development rather than an end moraine. It may suggest the presence of a confined subglacial meltwater stream moving under the ice at this location. Such processes for the formation of glacial features are only recently becoming understood. If this were the case, then the Trafalgar Moraine at this location would be the only known record of a moraine to have undergone S-form modification in Southern Ontario.

The hummock and kettle topography of the moraine is also of significance. This type of landform is rare on the south slope physiographic region. The south slope is dominated by a drumlinized till plain. The shallow kettles also promote enhanced internal drainage and may increase groundwater recharge on the moraine. Due to the fine-grained composition of the till, recharge is otherwise quite low where surface water can runoff

# HALTON REGION

## Environmentally Sensitive Areas

ESA N° 48

into the many small headwater streams, which dissect the moraine. A number of the kettles support wetland marshes, deciduous swamps and thicket swamps.

Land use throughout the Trafalgar Moraine East and West portions consists of intensive agriculture with several large woodlots (>4 ha). Although crossed by several concession roads and two Regional roads (Regional 25 and Trafalgar Road), the ridge rest is well preserved, as no east-west roads or major dwellings have been constructed on it. Canadian National Railways (CN Rail) have a rail line which cuts across the fluted portion of the moraine in the vicinity of Tremaine Road. The Region of Halton maintains a BioSolids Holding Facility on the moraine east of Regional Road 25. Low density residential occurs along Burnhamthorpe Road and a water reservoir has been constructed near the moraine crest on 6th Line. The major impact to the moraine in this area is Highway 407. The highway crosses diagonally over the moraine east of Sixteen Mile Creek and occupies part of the north slope of the moraine as far as Trafalgar Road where it again traverses the moraine. The open agricultural character of the ESA should be maintained as much as possible and any developments which require large scale regrading should be prevented.

Size:	No published information
Plant Species (total #) :	No published information
Plant Communities:	No published information
Animal Species:	No published information
Other designations:	Regionally Significant Earth Science ANSI
Ownership:	Private

### Criteria Fulfilled

#### Primary Criteria

**7) Areas that contain representative earth science features and/or processes typical of those which were instrumental in creating Halton's landscape.**

The moraine is the only glacial landform feature in Ontario which marks the position of the Ontario Lobe at the time of glacial Lake Peel, which was the last major glacial event of the Late Wisconsinan associated with this lobe. In addition, the moraine and its material (Halton Till) are highly representative of an important element of Halton's landscape below the Niagara Escarpment - the Halton Till Plain. The presence of the moraine was also instrumental in the formation of Sixteen Mile Creek as it caused the deflection of the photo East Sixteen Mile Creek westward to form a tributary of the main branch. Without the presence of the moraine, East Sixteen Mile Creek would have

flowed directly to Lake Ontario and the valley of Sixteen Mile Creek would not have been as deeply incised.

**Recommendation**

It is recommended that the Trafalgar Moraine be included as ESA in the Region of Halton and the provincial ANSI boundaries be adopted as the ESA boundaries for this feature.

**Sources of Information**

Chapman, L.J. and D.F. Putnam. 1984.  
Cowell, D.W. and P.S.G. Kor. 2002.  
Karrow, P.F. 1987.

# HALTON REGION

## Environmentally Sensitive Areas

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### 6.0 REFERENCES

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### APPENDIX 1. 1993/1995 ESA UPDATE STUDY

This appendix provides the detailed methods from the 1993 and subsequent update in 1995 (Geomatics International 1993, 1995).

#### 7.0 METHODS

Information was obtained from personnel in the Planning Department, the Halton Region Conservation Authority (HRCA) and EEAC throughout this project. A co-operative approach was taken so that staff and EEAC were able to comment and contribute at key stages. The revised selection criteria, planning considerations and access to EIA documents were provided to the consultant together with personal knowledge of ESAs in the Region.

This study was based primarily from existing information. The field component extended mainly to the evaluation of new candidate ESAs, where the objective was to determine if ESA criteria were satisfied, thus justifying ESA status. The scope of this project did not include visiting all ESAs, or undertaking extensive biotic inventory. Many descriptions of ESAs in section 7.0 are based on the 1978 ESA report. Information regarding potential impacts and the general character of ESAs was not changed unless there was sound evidence for doing so.

#### 7.1 Screening of Existing ESAs

Following the refinement and subsequent approval of the revised ESA criteria, it was necessary to re-evaluate existing ESAs to ensure they satisfied the new criteria. It was anticipated that there would be some changes in the designation of ESAs. The process used to select the original 38 ESAs is documented in The Environmentally Sensitive Areas Study (EEAC 1978).

Initially, the existing ESAs were screened using the new criteria. Following this, the original (1978) criteria used to designate each ESA were examined to ensure that valid attributes of each ESA had not been overlooked. Whether these attributes had changed during the period between the two studies was also evaluated. Based on the information currently available, two of the original ESAs do not satisfy the revised criteria.



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### 7.2 Refinement of Boundaries

The purpose of the boundary analysis was twofold:

1. To modify the existing boundaries of ESAs to provide the maximum protection for those features being protected; and
2. To compare the existing ESA boundaries with the boundaries of significant areas identified by other agencies in order to develop common boundaries, or to ensure that significant areas identified by other agencies (e.g. ANSIs) were contained within the Halton ESA boundaries. The boundaries identified by the following agencies were examined:
  - Ontario Ministry of Natural Resources - areas that have been designated as provincial or regional earth science and/or life science Areas of Natural and Scientific Interest (ANSIs), (Klinkenberg 1984, Hanna 1984, Gould 1989);
  - Credit Valley Conservation Authority (CVCA) - utilizing a different set of criteria, the CVCA has designated ESAs within the Credit River watershed, some of which lie within Halton Region (Ecologistics 1979)(see Appendix 2); and
  - Town of Oakville - land use policies identify Environmental Protection Areas (EPAs) as, "Areas having the highest level of environmental significance and ecological sensitivity..." (Town of Oakville Official Plan, 1991).

The boundaries identified by the Niagara Escarpment Commission were also considered (NEC 1985). In some cases the Ontario Ministry of Natural Resources wetlands boundaries on 1:10,000 OBM maps were also examined (OMNR undated) to ensure inclusion of provincially significant wetlands in existing ESAs. However, no systematic mapping of wetlands was undertaken.

It should be kept in mind that the specific criteria used for the selection of significant areas varies between agencies and thus, in some situations, it has not been possible to develop common boundaries. The boundaries, which best satisfy Halton's criteria and which are most defensible have been chosen.

The following differences between boundaries were noted during this study:

1. The Credit Valley Conservation Authority's criteria are based primarily on the hydrologic maintenance of the Credit River watershed. Upland forests and representative earth science or life science features considered by Halton may not be taken into consideration in CVCA ESAs.
2. The MNR ANSI program recognizes life science and earth science features separately, whereas Halton ESAs often enclose both these types of features within a single ESA.

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3. The 1:50 000 mapping of the Niagara Escarpment Commission (NEC 1985) was too coarse to permit direct comparison with the boundaries of Halton ESAs, which were being mapped at 1:10 000.
4. The 1:30 000 mapping of The Town of Oakville (Town of Oakville 1991) was similarly too coarse to permit direct comparison with the 1:10 000 Halton ESA boundaries.

The boundary analysis was undertaken through an overlay exercise using plots of the existing ESA boundaries and aerial photographs. Digital files of the ESA boundaries were obtained from the Cambridge District OMNR office and plotted on transparent vellum at a scale of 1:10 000. The scale was chosen to coincide with the Ontario Base Map series, the OMNR ANSI mapping, the CVCA ESA mapping and the scale of suitable aerial photographs. The OBM series, also available in digital (electronic) form, was proposed as a suitable base for production of the final maps.

Each ESA plot was overlaid on the appropriate aerial photograph(s) and land use was mapped in and adjacent to it. Land use was mapped as forest, old-field, wetland, golf course, farmland, plantations, quarries, roads and urban or rural residential. The boundaries of the ESAs were refined using the land use mapping. This land use mapping was for analysis only and is not provided in this report. However, this mapping was provided to the Region to facilitate future monitoring of land use adjacent to ESAs. The primary limitation of this process was the availability of recent aerial photography. The most recent photographs available at a suitable scale were flown in 1978. More recent photographs at a scale of 1:30 000 were unsuitable for use because of their small scale. It appears that the original boundaries of ESAs were determined largely from 1: 50 000 topographic maps with limited field checking. Thus, many changes to boundaries were recommended in this study. Some modifications reflect recent land use changes, for example, the quarry expansion in the Hilton Falls area.

Further refinement of boundaries was undertaken by overlaying the transparent plots of Halton ESAs on maps of MNR ANSIs, CVCA ESAs, and in some cases, OMNR provincially significant (class 1, 2, and 3) wetlands. The significant areas identified by other agencies were traced onto the ESA plots containing the land use information. This permitted a ready determination of discrepancies between Halton ESA boundaries and other significant areas. The final Halton ESA boundaries were determined through consideration of other significant areas boundaries and the land use mapping.

A set of guidelines for making decisions on boundary placement was developed in conjunction with the EEAC subcommittee and regional planning staff to maximize the consistency with which boundaries were determined.

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- boundaries generally followed the outside of wooded areas contiguous with the features being protected to fulfil criteria, or along topographic breaks (e.g., top of bank) in the case of valley systems lacking adjacent tableland forest;
- plantations were considered forested areas and included in ESA boundaries;
- old fields and areas in early stages of succession were included within ESA boundaries whenever they represented "inclusions" along an edge (e.g., if they were surrounded by ESA on three sides), however, boundaries were not extended to include old fields;
- large active quarries were excluded from ESAs, but abandoned borrow pits and older quarries (e.g., Kern's Road quarry), that may be regenerating naturally, were included;
- estate development which is primarily forested was included within ESAs where the forest was contiguous with the rest of the ESA, however, estate development in cleared areas was excluded and the boundary placed around the estate development on the edge of continuous forest cover;
- class 1, 2 and 3 wetland boundaries were used to help define the boundaries of ESAs 26 and 32. The most recent large scale mapping of wetlands by the OMNR was considered to provide the most accurate wetland boundaries for this purpose; and
- all provincially significant life science ANSIs were included within ESA boundaries, all provincially significant earth science ANSIs were also included, with the exception of the Paris, Galt and Moffat Moraine ANSI and the Halton Till ANSI; regionally significant life science and earth science ANSIs were also included within ESA boundaries with only three exceptions (Trafalgar Moraine, Milton Quarry and Exhumed Silurian Reef ANSIs).

There were a few instances where a narrow corridor of woodland extended for several kilometres from an ESA. If the strip of woodland or other habitat constituted a linkage or corridor between two areas, it was included within ESA boundaries. If it did not appear to enhance an attribute of the ESA, it was excluded.

In several cases it may appear on the mapping that two abutting ESAs could be combined to form one contiguous area. Examples of this are found between ESAs 17, 18, 19 and 20, between ESA 25 and 29, and between ESAs 32, 34 and 35. These natural areas were kept separate based on one or both of two factors. First, in each case major commuter routes divided these natural areas, and second, often these areas contained different natural attributes, which demanded individual recognition.

The preliminary recommendations on boundary changes were reviewed with the EEAC subcommittee and regional planning staff. Regional planning staff also reviewed the boundaries with the Credit Valley Conservation Authority, Halton Region Conservation Authority, Grand River Conservation Authority (GRCA), Town of Oakville, City of

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Burlington, Town of Milton and Town of Halton Hills. Comments received from these agencies were incorporated into the final boundary changes.

The final ESA boundaries were digitized by Geomatics International and provided to the Region of Halton. The Region overlaid the new boundaries on the digital OBM base to produce the maps in the ESA descriptions (section 7.0). In the future, it will be possible to produce plots of ESAs at almost any scale, however, the use of ESA boundaries plotted at scales greater than 1:10 000 should be undertaken with caution as the accuracy of those boundaries only reflects analysis at 1:10 000. Plotting ESA boundaries at larger scales (e.g., 1: 2000) does not increase their accuracy.

### 7.3 Evaluation of Candidate ESAs

Based on recommendations from the phase 1 report (Geomatics International 1991), the Terms of Reference, and discussions with planning staff and the EEAC subcommittee, 16 new potential areas were suggested for evaluation as ESAs. These included:

- Joshua's Creek pop-up earth science feature;
- Burlington Beach;
- woods near Centralized Sludge Storage Facility (CSSF);
- woods in southwest quadrant of Trafalgar Road and Lower Baseline Road;
- the 5 CVCA ESAs that occur in Halton region;
- woods on the east side of Guelph Line, opposite the Mohawk Inn;
- La Salle Park in Burlington;
- lower portion of 14 Mile Creek; and
- the National Sewer pipe property, east and west of King Road in Burlington.

All but the last two of these were examined in the field.

In addition, three large areas contiguous with existing ESAs were visited:

- the area to the southwest of ESA 17 (the Lac Minerals property);
- woods east of the Kern's Road quarry; and
- wooded areas east of ESA 20 (the Yaremko Property).

The choice of areas to be field checked was made on the basis of discussions with planning staff and the EEAC subcommittee. Fourteen sites were visited and evaluated with respect to the criteria for designating ESAs. Those candidate sites which fulfilled criteria were recommended for ESA status. Notes on earth science features, flora and fauna were taken in the field and incorporated into the ESA database. However, it should be noted that the emphasis was placed on determining whether the candidate sites fulfilled designation criteria, not on undertaking comprehensive floral and faunal

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inventory. For this reason, the descriptions of the five new ESAs contain less information than the original ESAs.

#### **7.4 Updating ESA Database**

One of the recommendations provided in the phase 1 report (Geomatics International 1991), was the updating of the biophysical database for each ESA. The multitude of inventories and consultant investigations, as well as completion of standard reference documents such as the Atlas of the Rare Vascular Plants of Ontario (Argus et al. 1982 - 1987) needed to be incorporated into the ESA files. The new information is important for strengthening the evidence that supports the designation of ESAs. In addition, it will document our current knowledge of ESAs and indicate those areas which require further investigation. A complete list of all the references consulted for updating each ESA is provided.

#### **7.5 Earth Science Features**

The earth science component of this ESA study was significantly updated from the original study (EEAC 1978). The updating included the determination of the most recent 'degree of significance', which each area has been assigned under the Ministry of Natural Resources ANSI Program (provincially or regionally significant). In addition, those ESAs, which incorporate portions of the Niagara Escarpment, are identified as being Internationally Significant on the basis of the escarpment's selection as a Biosphere Reserve under UNESCO's Man and the Biosphere (MAB) Program. Also, if ESAs occurred within the Niagara Escarpment Plan Area or the Niagara Escarpment Planning Area, these designations were identified. The Niagara Escarpment Plan Area includes areas that have been studied by the Niagara Escarpment Commission (NEC) and identified as either Escarpment Natural Areas, Escarpment Protection Areas or Escarpment Rural Areas. The Niagara Escarpment Planning Area includes those lands on, or in the vicinity of the Niagara Escarpment, which have not yet been studied by the NEC.

The technical and scientific literature was also reviewed to ensure that the earth science component of each ESA has been correctly described and to develop more complete descriptions for those ESAs meeting the Earth Science Criterion. The full range of representation occurring within each ESA is summarized in tabular format at the beginning of the ESA descriptions, according to chronostratigraphy (Palaeozoic, Pleistocene, Recent) as well as landform type (moraines, beaches, drumlins, etc.). A summary table provides an overview of the earth science representation in Halton and the ESAs.

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An earlier draft of the summary was used to determine significant gaps in the earth science representation for the Region of Halton (Geomatics International 1991). Subsequent literature analysis was utilized to identify those features, which were already represented in the ESA program but not described in the 1978 study, as well as to identify possible locations for new ESAs. The major sources for these analyses include the surficial mapping undertaken by Karrow (1968, 1987a, 1987b), the bedrock geology mapping undertaken by Telford et al. (1974) and the Ontario Division of Mines (1976, Colour Maps 2342 and 2336).

Earth science field work was conducted in August and September of 1992 to check boundaries and representation in selected ESAs as well as determines the most suitable locations for earth science representation outside those ESAs designated in 1978. New ESAs based primarily on the Earth Science Criterion (i.e., Joshua's Creek Pop-up, ESA 40; Paris Moraine, ESA 39; Brookville Drumlin Field, ESA 44) were selected to fill significant gaps in earth science representation. In addition, Joshua's Creek Pop-up coincides with a provincially significant earth science ANSI.

#### 7.6 Flora

The following sources were examined to update the floristic database:

- relevant consultant reports;
- the computerized database maintained by the HRCRA for conservation authority properties;
- OMNR ANSI reports;
- OMNR rare species mapping (from Southern Region office, Aurora);
- ESA update reports; and
- the compilation of rare plants in Halton ESAs undertaken in Phase 1.

A common problem with floristic databases is the introduction of erroneously named plants, either owing to misidentification or application of an out-of-date name. It is very difficult to track down suspicious records at a later time, thus considerable effort was expended to ensure future researchers understand how the floral database was constructed.

A list of vascular plants occurring in each ESA was compiled. Non-vascular plants (mosses, lichens and liverworts were not included). The primary database used for this list was the preliminary checklist of vascular plants assembled by Dr. William Crins (Crins 1986) for Halton Region. Dr. Crins is still working on this list and will eventually produce a comprehensive flora of Halton. The preliminary list is based only on collected plant specimens. In other words, plants that are not represented by specimens, or were recently collected and have not been examined by Dr. Crins, are not on the list. Owing

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to this, there are a number of species which definitely occur in Halton, but are not on the preliminary list. Therefore, it is important to realize that the number of plant species listed for a given ESA is as much a reflection of the level of survey effort as the numbers of species actually there.

When compiling the plant list, each plant record was first checked against the preliminary list (Crins 1986). If it was on this list, it was considered valid and added to the database for the ESA from which it was reported. If it was not on the list, it was checked against A Checklist of the Flora of Ontario (Morton and Venn 1990). If the species in question was not on the Ontario list, it was rejected for inclusion in the ESA database. If it was on the Ontario list, and the consultant team had no reason to suspect the record was in error, it was added to the ESA database for which it was recorded. All records of plants reported from Halton ESAs that were not on Dr. Crins' preliminary list were noted separately on an ESA-by-ESA basis. This will facilitate correction of each ESA database should future investigations show any of these records to be in error.

Some other plant records were also rejected for nomenclatural reasons. For instance, the common blue violet (*Viola papilionacea*) has been split into three separate species. Since there was no basis to judge which of the three species the reported plant should be assigned to, it was omitted from the ESA database, but a record of such species was kept. All records based on genera only (e.g., *Carex* sp. or *Carex* spp.) were not counted as part of the database, but again a record was kept.

Two categories of significant plants were noted: nationally/provincially rare and regionally rare. The former categories were defined using Argus et al. (1982 - 1987) and Argus and Pryer (1990). Regionally rare plants were defined using Dr. Crins' files which, as previously noted, are based solely on collected specimens. Any plant species which occurs in five or fewer locations in Halton Region is considered regionally rare. A location is defined as an area of a known population of a rare plant species, which is separated from other known locations by at least one kilometre of unoccupied or unsuitable habitat. Although the flora of the Region is well studied compared to most other jurisdictions in Ontario, there is still much that remains undocumented, thus the list of regionally rare plants can be expected to change as additional plant records are documented with specimens.

It is hoped that a mechanism will be developed to maintain a database for each ESA. This process should include a screening exercise that will ensure the database is not corrupted by erroneous records. All the plant lists and rejected records for each ESA were submitted to the Region of Halton as part of the final product of this study.

Numbers of vascular plant species are recorded in the ESA descriptions. ESAs that had fewer than 100 species documented were reported as such. These low figures are

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in no way representative of the flora of any ESA. With few exceptions, the flora is still poorly documented for most ESAs, and the species richness reported should be considered tentative and minimal. ANSI inventories have contributed significantly to the knowledge of those areas.

#### 7.7 Plant Communities

No systematic inventory of the vegetation communities of Halton Region has ever been undertaken. Plant community delineation is often problematic as it involves considerable subjective judgement in most cases, thus two botanists or plant ecologists may delineate the plant communities of a given area differently.

In order to introduce some consistency into the delineation and definition of communities, the decision was made to utilize *A Classification of the Natural Communities Occurring in Ontario* (Working Draft) (Kavanagh and McKay-Kuja 1992) as a basis for defining plant communities. This work provides a four level, hierarchical classification of natural communities in Ontario.

All the sources of information were screened for information on plant communities in ESAs. Since none of the existing information sources had used Kavanagh and McKay-Kuja (1992) to define communities, the consultant team had to interpret each of the vegetation units in the existing information sources and assign them to one of the communities in Kavanagh and McKay-Kuja (1992). A few new categories were added to account for disturbed communities such as old fields, abandoned orchards etc. (the classification only defined natural communities). The Natural Heritage Information Centre (NHIC), in conjunction with the Ministry of Natural Resources, is preparing a system entitled Ministry of Natural Resources Southern Region Ecological Land Classification. This system, as it becomes available, should be referred to for a standardized approach to the classification of natural communities (Bakowsky, pers. comm. 1994).

The communities known to occur in each ESA are listed in the ESA descriptions. The community number is also provided to identify the level in the hierarchy in which the community is identified (see Table 2, section 5). Table 2 represents an attempt at listing the vegetation communities found in Halton. This list will have omitted several communities, however, it does provide a good basis for further work. Table 2 also identifies the ESAs where each community type can be found.



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#### 7.8 Fauna

All the relevant sources of information were reviewed for data on the fauna occurring in Halton's ESAs. In addition, the mammal specimen catalogue (trapping records from various inventory projects) at the HRCA and a survey of Halton mammal records from the Royal Ontario Museum, undertaken for an inventory project at the HRCA, were examined. The latter review included reptiles, amphibians, birds and mammals, but excluded invertebrates and fish.

Consideration was given to examining data from the Atlas of Breeding Birds of Ontario (Cadman et al. 1987), the Ontario Rare Breeding Bird Program (ORBBP 1988-1993) and the Ontario Herpetofaunal Summary program (Ontario Field Herpetologists 1990). In the case of the first two studies, the data are recorded on a presence/absence basis for 10 km<sup>2</sup> grids throughout the southern part of the province. Since no ESA covers all of a square, there is no way to determine if a particular species record is within ESA boundaries. However, in the case of herptiles, their presence can be determined with certainty since most observers submit a UTM reference with their records which is accurate to 100 metres. The raw data from which the distribution maps in the two bird programs are derived is restricted from general distribution, but may be made available through special arrangement. However, it would be a lengthy task to sort through the voluminous amount of information to confirm which records are from within ESAs. In the case of the Ontario Rare Breeding Bird Program, the data on species breeding location are, understandably, restricted.

There has been no comprehensive investigation into fisheries data for Halton's ESAs due to the fact that this information has not been compiled by any agency. To undertake this task would have been beyond the scope of this study. However, Ministry of Natural Resources rare species mapping, which includes fish data, was reviewed. Rare fish species identified within Halton ESAs were included as part of this study.

As with the plants, a list of fauna occurring in each ESA was assembled. In the ESA descriptions, the number of reptiles and amphibians are combined into one category, herptiles. Bird records are broken into three categories: breeding (B), possibly breeding (P), and other (O). When reviewing the existing information, bird records were assigned to one of these three classes based on the amount and type of information provided. Evidence of breeding included accepted standards such as nest with eggs, adult carrying food etc., records of species displaying territorial behaviour during breeding season were assigned to the "possible" category and all other records were assigned to "other". As the numbers reflect species recorded from reports, surveys etc., they occasionally differ from reports in the accompanying text, which was usually derived from the 1978 ESA study (EEAC 1978). Numbers in the 1978 study were often supplied by birdwatchers who used personal field notes which are no longer available.

**APPENDIX 2. 2002 ESA UPDATE STUDY**

**8.0 METHODS**

Limited fieldwork was undertaken in order to evaluate the condition of some existing ESAs, and evaluate a number of new, candidate ESAs. In addition, the digital ESA database was refined and updated, and the current status of rare and otherwise significant flora and fauna was crosschecked against ESA inventories. The ESA update consisted of the following specific tasks.

**8.1 Examination of ESA Criteria**

The wording of the existing ESA criteria as outlined in the Regional Official Plan, (1995) was reviewed in order to identify any potential for clarification or minor revision to wording that would better reflect recent advances in the identification of significant natural biophysical features.

**8.2 Review and Update ESA Database**

The status of the existing ESA database was investigated. A number of findings indicated that the database required updating and needed quality control checking before it could be used for evaluating current ESA status. A full and complete update of the ESA database (including field investigations of ESAs with little information) was considered beyond the scope of this present assignment. However, the creation of a more comprehensive digital database from the existing hardcopy files and numerous reports, as well as updating the status of areas and species was undertaken. To update the database, the following tasks were initiated:

1. The first step was to create two new tables to form the basis of the Halton ESA plant list and the Halton ESA fauna list. These tables now include scientific and common names, as well as national, provincial and regional rarity status for all species recorded in Halton ESAs. In addition, the plant table contains Floristic Quality Assessment (FQA) coefficients of conservatism for all of the plant species.
2. Four other tables were added to the database; one to document ESA names, designations, size, etc., one to document citations for plant and animal records and two tables to list phylogenetic orders of plant and animal families. These were required for the creation of the summary tables.

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3. The next step was to update the acronyms used in the original plant and animal tables to a standard format and remove duplicate records. For plants, the acronym format follows the conventions used in the FQA (Oldham et al. 1995). A plant acronym is composed of the first three letters of the genus name and the first four letters of the species name. If a subspecies or variety is present, the first three letters of this name are included at the end of the acronym. For birds, the acronyms follow the four letter codes provided in the Ontario Breeding Bird Atlas Guide for Participants (2001). All other animal species were given four-letter acronyms following the same protocols used for birds. If the common name is one word, the four-letter acronym consists of the first four letters. If the common name is composed of two words, the first two letters of each word are used to compose the acronym. If the common name is composed of three words the first letter of the first two words and the first two letters of the last word are used to compose the acronym.
4. The plant and animal lists for each ESA were cross-checked and updated as necessary using the following references:
  - the Geomatics (1993) checklists provided by the Region;
  - the rare species documented in the Geomatics (1993 and 1995) Halton ESA update reports; and
  - all applicable ANSIs, wetlands, Hamilton-Wentworth ESAs and consultant reports where information was available.

### 8.3 Addition of Fisheries Data

Conservation Halton, Credit Valley Conservation and the Grand River Conservation Authority assisted with the completion of this task. All of the proposed ESA boundaries and possible expansion areas were sent to the Authorities in January 2002 in order that they could provide fisheries information (i.e., habitat, species) for all of the ESAs. The fisheries information received from the Authorities will be added to the database of information for each ESA.

### 8.4 Reconsideration of ESAs

A review of the 1993 findings on these areas, as well as any new data, was undertaken to identify potential changes of status of these areas and evaluate their candidacy as ESAs. The consultant undertook reconnaissance field inspection to confirm approximate extent, condition and status of these candidate ESAs and document their present condition and findings. Recommendations were provided with clear explanation for retention or rejection of candidate ESAs.

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#### **8.5 Cross Reference All ESAs with Current MNR Wetland and ANSI mapping**

Differences in boundaries of provincial ANSIs and wetlands, and ESA boundaries were reconciled to the extent possible. The region assisted in this task by overlaying all new ANSI, wetland, and existing ESA boundaries over recent digital aerial photographs to identify discrepancies. Discrepancies were identified as either minor differences owing to scale of mapping (e.g., differences of less than 10m were not considered meaningful for this scale of study and are probably a reflection of mapping error) and bona fide differences in the extent of features captured within a boundary, reflecting differences in the interpretation of where a boundary should fall. The need and possible approaches to resolving minor discrepancies was discussed among Regional staff, EEAC and the consultant.

A work session with the EEAC subcommittee to resolve boundary issues was conducted, thus involving them in the decision-making and providing EEAC with some ownership over the resulting boundaries. The boundary decisions also included consideration of the criteria for which each ESA was identified. If a new boundary resulted in the ESA fulfilling a criterion more fully, or increased its ecological integrity and resilience to disturbance, it was recommended. As part of this task, criteria were established for deciding on boundary issues that can be applied to all ESAs, thus providing consistency and defensibility.

It should be noted that it is not desirable to reconcile all boundaries, as noted in section 2.2 of the 1993 Geomatics Report. Different programs (CVC ESA study, ANSI program, etc.) have different goals and objectives and coincide with Halton's ESA program to varying extents. The ESA boundaries must primarily reflect the aims of Halton's ESA program.

#### **8.6 Re-examine New Acton Swamp and Galt and Moffat Moraine**

The re-examination of these areas required that the boundary analysis be completed. It also required the review of ANSI reports and wetland evaluations. The two proposed ESAs were then reviewed to evaluate the extent to which they fulfil the ESA criteria. This included a review of the Geomatics (1993) work to see if recommendations made then still applied.

#### **8.7 Review of Wildflower Woods and Joshua Creek Valley**

These two ESAs were proposed to be deleted as a result of the 1993 Geomatics analysis. EEAC requested further investigation before the recommendation was accepted. Owing to the time of that review, field visits were not possible. These sites

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were visited as part of the current study to specifically evaluate them with respect to the criteria used to originally identify them. There is the potential to learn about the effects of development near or adjacent to ESAs at these two sites. Any impacts that are attributable to development since 1978 were commented on and documented.

#### **8.8 Cross Reference all ESAs with Up-to-Date Status of Species at Federal, Provincial and Regional Levels**

A list of significant flora and fauna was produced for each ESA. It was not possible to determine the regional status for all animal groups, since they are so poorly documented in Halton (e.g., bats, small mammals, etc).

#### **8.9 Products of the 2002 ESA update study**

Several products resulted from the 2002 ESA update study, they are as follows:

1. An updated, quality checked and fully documented database providing information on the flora, fauna and vegetation of Halton's ESAs.
2. Updated ESA boundaries, which account for MNR, ANSI and wetland boundaries.
3. Updated review of the ESAs originally proposed for deletion.
4. Review of proposed new ESAs resulted in the recommendation for 6 new ESAs: No.39 Paris Moraine, No.42 New Acton Swamp, No.45 Galt and Moffat Moraine, No.46 Burlington Beach, No.47 Black Creek at Acton, and No.48 Trafalgar Moraine.
5. Current lists of significant flora and fauna for each ESA.
6. Reassessment of ESAs with respect to the designation criteria, with regard to: changes in significant species, new boundaries, and designations as ANSIs and/or wetlands.
7. A summary report which fully documents all decisions made, new criteria and the process for resolving boundaries and ESA status.

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### 8.10 Protocols for Database Update and Refinement

#### 8.10.1 Literature Review

If a checklist (from Geomatics 1993) was available for an ESA, the assumption was made that all reports available at the time had been included, and would be in the database already. Therefore, any reports written prior to 1993 were not re-examined. For ANSIs located on the Niagara Escarpment, reports written prior to 1993 were not included in the database based on the assumption that the Riley et al. (1996) report incorporated all previous documents prepared for the ANSI. If neither of the above reports were available for an ESA, records from all available reports were entered into the database.

The following protocols were used to determine if plant or animal records from a specific report should be incorporated into the database.

- All available plant and animal records from a document (site summaries for ANSIs, Hamilton-Wentworth ESAs, wetland evaluations, consultants reports, etc.) were entered into the database only if the site boundaries fell completely within the ESA boundaries. For sites where the boundaries extended outside ESAs, plant and animal records were not entered into the database, a note was added in the comments field that confirmation of the record form within the ESA or not. If records from such reports were already present in the original database, a note was added in the comments field that confirmation of the record from within the ESA is required. If the site was concurrent with the ESA and species were present in the database but not in report, the records were deleted from the “species table”. However, any rare species in this situation were noted in the comments column on the database summary table as requiring confirmation. Although this approach results in conservative species lists for ESAs, it provides a high degree of confidence that the records are correct and this substantially increases the defensibility of the ESAs.
- In the case of ANSIs on the Niagara Escarpment, animal records documented in Riley et al. (1996) only as either occurring within 1km of the ANSI or in the vicinity of the ANSI (but not within the ANSI) were not incorporated into the database regardless of whether the ANSI and ESA boundaries overlapped.
- Records of fish species were provided by the Credit Valley Conservation, Grand River Conservation Authority and Conservation Halton. The CVC and CH records were incorporated, however, records from the GRCA were not incorporated into the database due to a lack of specific location information. Both the CVC and CH data included records of species within approximately 100m of the ESA boundaries, as well as those from actually within the ESAs. Including these in the database was considered reasonable owing to the high mobility of fish species

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and the expectation that species found within 100 metres of ESAs would also occur within them.

#### 8.10.2 Flora

Nomenclature of plant species in the database follows the Ontario Plant List (Newmaster et al. 1998), with one exception. If a plant species has been split into more than one subspecies or variety in the Ontario Plant List but the subspecies or variety in the Ontario Plant List but the subspecies was not specified in the source document, the nomenclature in the source document was used. For example, maidenhair spleenwort is listed as *Asplenium trichomanes* in the 1993 Halton checklists and in the Natural Heritage Information Centre (NHIC) plant lists (NHIC 2000a,b), however the Ontario Plant List (Newmaster et al. 1998) lists two subspecies of maidenhair spleenwort (*A. trichomanes* ssp. *trichomanes* and *A. trichomanes* ssp. *Quadrivalens*) and Riley et al. (1996) reports *A. trichomanes* ssp. *quadrivalens* from ANSIs in Halton. As a result, the database contains records for both *A. trichomanes* and *A. trichomanes* ssp. *quadrivalens*, in some instances from the same ESA. Correcting nomenclature issues such as these requires examination of the actual plant in question (either in the field or herbarium collections). Michael Oldham (NHIC) was consulted regarding questions on provincial rarity status, hybrids and floristic quality indices, and Dr. William Crins (MNR, Peterborough) was consulted regarding rarity status in Halton Region and non-native status.

#### 8.10.3 Floristic Quality Assessment

All native plant species were assigned a coefficient of conservatism based on the Floristic Quality Assessment (Oldham et al. 1995) with two exceptions. Native plant hybrids are not designated coefficients in the FQA and thus do not have coefficients assigned in the database. If a native subspecies or variety has been recognized since the FQA was written, no coefficient is available and thus also not assigned in the database. Only those ESAs with more than 100 documented native vascular plant species has a Floristic Quality Index and Native Mean Coefficient generated (see appendix 2 for a discussion of the floristic quality indices).

#### 8.10.4 Fauna

Nomenclature for animal species follows the NHIC website (NHIC 2000c,d,e,f). Breeding status for birds was entered in three separate columns due to discrepancies in codes used between reports. Breeding status in Riley et al. (1996) are recorded in one column and breeding status from the Geomatics (1993) checklists are recorded from other reports and to record a code that combined status' from records provided in both Riley et al. (1996) and Geomatics (1993). The breeding status with the highest level of confirmation was assigned to the third column and was used for determining the rarity status of bird species in the database. For example, if a bird were recorded as "observed" in one column and "probably breeding" in the second column, then "probably breeding" would be used as the current status.

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#### 8.10.5 Rarity Status

Global, provincial (subnational), COSEWIC and MNR rarity status for plants and animals was obtained from the Natural Heritage Information Centre (NHIC) website (NHIC 2000a,b, c, d, e, f). However, if a plant species had been split into a subspecies or variety (see discussion above) no rarity status was assigned. The regional rarity status for vascular plants in Halton Region currently follows Crins (1986). Rarity status for bird species (national, provincial or local) have been assigned only to those records that are documented in the database as breeding (see discussion above). There are not local rarity status lists in Halton for mammals, reptiles, amphibians, fish or insects. Rare species status, whether national, provincial or local, do not include historical records. Historical records are those, which have not been confirmed since 1970.

#### 8.10.6 Floristic Quality Assessment (FQA)

The Floristic Quality Assessment allows for an objective numerical evaluation of an area based on the quality of its flora. It can be used to compare two or more areas or compare an area at two different points in time (as in a monitoring program). It is extremely useful for measuring the success of management and restoration programmes. However, it is important to realize that it is just one tool for assessing sites, and should be used in conjunction with other site characteristics and evaluation criteria. The results of these assessments should be interpreted by someone with skills in plant ecology.

The premise upon which the evaluation method is based derives from the fundamental character of a region's flora, in particular the degree of faithfulness each plant species displays to a specific habitat. Some plants are very demanding in the quality of habitat in which they will persist and are thus restricted to habitats where predominantly natural processes prevail, and which have not been substantially altered by human activity. Other species are not as demanding and occur in a variety of habitats, many of which reflect a history of human disturbance. Each native species in the flora is assigned a numerical value from 1 to 10. This is referred to as the "coefficient of conservatism". Species with high coefficients (6 to 10) are the most conservative in their habitat requirements, and thus the ones most representative of high quality habitat. Species with low numbers (1-3) will occupy a range of habitats and are not indicative of high quality habitat. Species with low numbers tend to be those that are adapted to disturbed conditions.

The numbers have been assigned for Ontario by a group of experts on the provincial flora (Oldham et al. 1995). In order to evaluate a site, a species list is compiled, and the coefficients of all native plants are summed and divided by the total number of native species to yield a mean coefficient. A Floristic Quality Index (FQI) can then be calculated by multiplying the mean coefficient by the square root of the total number of



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native species. Areas can then be compared using their mean coefficient and/or the FQI.

During an inventory of plants in a given area, the mean coefficient of conservatism tends to stabilize quite quickly as new plants are recorded and included in the total for the site. The mean coefficient thus serves as a reliable indicator of ESA quality even when only reconnaissance inventories are available. However, the FQI is more influenced by species richness, therefore areas that have complete inventories tend to have higher FQIs.

### 8.11 Evaluation of ESAs

Part of the 2001/2002 ESA update work consisted of a review of candidate ESAs, as well as the review of the two existing ESAs: Wildflower Woods and Joshua's Creek. The recommendations regarding these areas are based on a review of existing documentation, consultants reports prepared for the various areas, brief field inspections of all areas, and aerial photograph assessments of all areas. It is recognized that a hydrogeologist should review the following sites and all other areas within the Region of Halton to determine if the proposed ESAs or any other areas of Halton fulfil any of the groundwater criteria for ESA designation.

Most of the ESAs would benefit from a summer field program to provide better inventory information, identify management concerns (e.g. related to over use, need for trails, impacts from nearby development, etc.), and to confirm/refine boundaries. The wetland evaluation for New Acton Swamp (wetland complex) is currently under review by MNR and therefore the boundaries for this area were not examined. When the MNR have completed their review, any new information should be refined. Similarly, an evaluation of life science features, in particular the wetlands, associated with the Trafalgar Moraine are scheduled to be undertaken by MNR in the summer of 2002. When this work is completed, relevant information should be incorporated into the ESA database and files.

Summary of ESAs evaluated as part of the 2002 Update Study

Recommended as ESAs:

- Burlington Beach
- Black Creek at Acton
- Woods adjacent to Halton Sludge Plant
- Galt and Moffat Moraines
- Paris Moraine
- Trafalgar Moraine
- New Acton Swamp

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### Not Recommended as ESAs:

Woods opposite Mohawk Inn  
La Salle Park, Burlington

### Recommended for Deletion:

Wildflower Woods  
Joshua Creek Valley

### Recommended for Further Study:

Former National Sewer Pipe Lands

## 8.12 Re-Screening of ESA for Significance

The ESAs were not systematically screened for all the designation criteria. Since the database task included updating inventories of ESAs and the significant status of flora and fauna, the main changes were expected with criterion #1 (species richness) and criterion #6 (nationally and provincially rare flora and fauna). Since the last update report (Geomatics 1995), new authorities for designation the national and provincial significance of plants have been established (primarily the NHIC). Also, there has been a substantial amount of inventory work completed in some ESAs, which has been incorporated into the ESA database. In order to ensure that all ESAs were evaluated with respect to criteria #1 and #6, each ESA was screened using the updated database. A number of ANSI and wetland evaluations had also been undertaken in recent years so the summary table was updated to reflect new designations. Also, the review of inventory work identified one rare community (fen) in Halton and this is also noted below.

Two ESAs are re-assessed as fulfilling criterion #1, owing to more complete species inventories resulting in over 300 native species now being recorded from them. They are ESA #18 Crawford Lake-Rattlesnake Point Escarpment Woods (420 native plant species) and #19 Calcium Pits (305 native plant species). However, two ESAs, which fulfilled criterion #1 in 1995, are no longer recorded as having 300 or more plant species. ESA #16, Sixteen Mile Creek Valley was reported as containing 308 native species in 1995, but only 285 are documented there at present, and #17 Milton Heights which was previously reported with 302 species is now thought to have only 290. In both these cases, reductions are not due to actual loss of species, but to either refinement in the ability to track species numbers (richness can be accurately determined now using the digital database, whereas a hardcopy checklist was used in the 1995 study), and/or changes in nomenclature or taxonomy.

The screening only identifies one additional ESA (#37 Hungry Hollow), as fulfilling Criterion #5 (rare plant communities) owing to the discovery of a fen there.

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Ten of the ESAs, which were not identified as fulfilling Criterion #6 in the 1995 report, are now revised and are identified as currently fulfilling the criterion. The ten ESAs are:

- #9 Lowville-Bronte Creek Escarpment Woods;
- #12 Fourteen Mile Creek;
- #29 Speyside Escarpment Woods;
- #30 Waterfall Woods;
- #31 Limehouse Cliff and Woods;
- #32 Silver Creek Valley;
- #34 Snow's Creek Woods;
- #35 Terra Cotta Woods;
- #36 Georgetown Credit River Valley;
- #37 Hungry Hollow Ravine.

Updated lists of significant species for these, and all ESAs, are provided in Appendix 3. Interestingly, all 10 of these ESAs were identified as fulfilling criterion #6 in the original 1978 ESA report, but owing to changes in the designation of provincial and national rarity in the 1980s, they did not satisfy the criterion in the 1995 update. This demonstrated the need to periodically update the ESA report.

Eight ESAs are newly reported as containing provincially significant wetland as a result of on-going upgrades in the wetland evaluations: #3 Grindstone Creek Valley, #8 Mount Nemo Escarpment Woods, #16 Sixteen Mile Creek, #19 Calcium Pits, #30 Waterfall Woods, #31 Limehouse Cliff and Woods, #32 Silver Creek Valley. The new ESA, #47 Black Creek at Acton, also fulfills this criterion.

Three more of the original 38 ESAs (EEAC 1978) now have ANSI designations: #33 Ballinafad Pond, #35 Terra Cotta Woods, and #36 Georgetown Credit River Valley. Two of the newly recommended ESAs, #435 Galt and Moffat Moraine, and #48 Trafalgar Moraine also have ANSI designations. Lastly, three more of the original 38 ESAs are recognized as having MAB (Man and the Biosphere) designations by virtue of being part of the Niagara Escarpment: #7 Lake Medad and Medad Valley, #8 Mount Nemo Escarpment Woods, and #32 Silver Creek Valley. These "new" MAB designations were likely oversights from the last update.

### 8.13 ESA Boundary Refinements

Reconciliation of ESA boundaries with designated ANSIs and wetlands was conducted by overlaying these boundaries. The results were then examined and compared to all ESA boundaries using the following five criteria. These boundary refinements were then

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reviewed and accepted by the EEAC subcommittee. The Region digitized the refinements and the updated maps were provided.

1. The ESA boundary was amended to follow the ANSI and/or wetland boundaries where it was felt that the intent of the ANSI and/or wetland mapping was to delineate the same area as the ESA.
2. If it appeared that the intent of the ANSI and/or wetland boundary was to delineate different areas (e.g., a large section of contiguous forest outside of the ESA or a nearby but disjunct wetland or forest) then these areas were highlighted. Some of these were designated on the mapping as possible expansion areas. Additional fieldwork will need to be undertaken during the field season to evaluate these areas and determine if the boundaries of existing ESAs should be further refined to incorporate them.
3. The following types of developments were excluded from ESAs based on the interpretation of the aerial photographs: golf courses, industrial development, quarry expansion, suburban residential, and large-scale agricultural expansion.
4. ESA boundaries were adjusted where registration of the boundary appeared to be a problem (e.g., the ESA boundary clearly approximated the outline of a forest but the boundary was shifted). In these cases the new ESA boundary was redrawn to follow the natural feature(s) that was supposed to be captured by the original line.
5. All ESA boundaries were “cut” at the regional political boundary regardless of whether the feature continued beyond the political boundary.

#### 8.14 Recommendations

While undertaking the review of the ESAs in Halton, a number of tasks have become evident that would add to the knowledge of the ESAs and/or further improve the accessibility of existing information. These are discussed below.

##### Information on ESAs

1. Collect data for those areas that are poorly documented.

As shown in Table 4, there are a number of ESAs for which there is little or no information on flora and fauna. We arbitrarily considered ESAs with fewer than 100 species of plants or 30 species of fauna to be in dire need of inventory. There are some of the ESAs designated primarily for earth science features (eg. Burlington Beach, Joshua Creek Pop-Up or Ballinafad Esker), or some of the very small ESAs (eg Ballinifad Pond) would not be expected to support 30 species of wildlife, or in some cases 100 species of plants, thus some judgement is required in interpreting the following list. The areas identified as priorities for additional inventory work are:

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- Bridgeview Valley
- Guelph Junction Woods
- Moffat Swamp
- Brookville Swamp
- Knatchbull Swamp
- Blue Springs Swamp
- Fairy Lake Marsh
- Waterfall Woods
- Limehouse Cliff and Woods
- Ballinifad Esker
- Paris Moraine Complex
- Joshua Creek Pop-up
- Hungry Hollow Ravine (this ESA is currently being inventoried by North-South Environmental Inc. for the Save Our Ravine local resident group);
- New Acton Swamp
- Drumquin Woods
- Brookville Drumlin Field
- Galt and Moffat Moraine
- Burlington Beach
- Trafalgar Moraine

### 2. Evaluate Expansion Areas

Several possible expansion areas adjacent to existing ESAs were identified during the boundary refinement exercise. These areas are shown on the key map of Halton. These areas should be studied in the context of the existing ESAs and the criteria that are met, to see if part or all of the areas identified should be incorporated into existing boundaries.

### **Further Refinement of Database**

#### 1. Update status of regionally significant plant species in the Region

At present, Regional status of plants is based on the Crins 1986 list with some refinements based on personal communications. Dr. Crins recently produced an updated status list (1999), however, this was received too late to incorporate into the database during this project. MNR is also preparing a list of significant plant species for the GTA including the status of plants in Halton Region. We recommend that the pending MNR report be used as the standard for the establishing regional status of plants in Halton. However, if the MNR list is not available by the time the next update is produced, or if current status is required as part of an EIS or other environmental evaluation, then reference should be made to Crins (1999).

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### 2. Incorporate Significant Species Information from MNR ANSI Reports

There are several ESAs which partially, but not completely, coincide with MNR ANSIs. Because specific locality data for significant species are not provided in the ANSI reports, it was not possible to determine which significant species were within the ESAs, and which were in those portions of the ANSIs outside of ESAs. The specific locality information for species in these ANSIs should be obtained from the NHIC and added to the ESA database where appropriate.

### 3. Further update plant communities

The vegetation communities currently in the database are those that were entered when the original database was assembled. These were based on the communities originally listed in the Geomatics 1993 report, and had been interpreted to conform to the provincial Ecological Land Classification (ELC) by Anthony Goodban (around 1999). This list should be checked and reformatted based on the current ELC list, and the vegetation community table in the database updated. The ELC descriptions should be incorporated into ESA write-ups when the ESA report is re-written. The list should also be refined based on the communities recorded in recent wetland and ANSI reports.

### 4. Incorporate GRCA fisheries data into the database

The GRCA fisheries information was not incorporated into the database owing to the uncertainty of the location in which sampling was undertaken. More accurate location information should be obtained from GRCA and the appropriate data entered into the database using the protocols established in this study.

### 5. Boundaries and evaluation of New Acton Swamp

The mapping for New Acton Swamp is currently under review by the MNR. If and when it is completed, the ESA boundaries should be reviewed to determine the extent to which they can be aligned with the wetland boundaries, consistent with the protocols used in this study.

### 6. New Name for New Acton Swamp

There is already an ESA called Acton Swamp (#28), and the name "New Acton Swamp" (#42) continually creates confusion. This latter name was used as a "working name" during the Geomatics 1993 study, and the intent was to re-name it. However this was never done. We recommend that EEAC be assigned the task of selecting a new name for ESA #42 to avoid continued confusion in the future.

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#### 7. Refine database to increase user friendliness

The database as it stands now provides a record and storage of current data on Halton's ESAs. However, it requires knowledge of Microsoft Access '97 to manipulate and access data, and thus does not facilitate the dissemination of information to many potential users. It is recommended that the database be further refined to facilitate easy use by planning and other internal departments at the Region, as well as the local municipalities. This will promote the ESAs by making their special attributes more widely known, and further facilitate their protection. Raising the profile of the ESAs through database use will also serve to illustrate where additional information is needed and potentially garner greater participation and support for future upgrades and data collection. The refinements should include linking data and site descriptions to digital mapping.

#### Other

#### 8. Inform other stakeholders of update and database

The results of this update, especially the existence of a comprehensive database should be made known to the local municipalities, conservation authorities, and adjacent municipalities with respect to ESAs that span regional/county boundaries. Landowners affected by ESAs should also be included in stakeholder notification. It should also be provided to Regional Council as an information item, so that they are aware of the ongoing work to maintain and protect the Region's Natural Heritage. The database and updated mapping should be showcased at some local events or open houses to raise general awareness of its existence.

#### 9. Inform City of Burlington of the Oaks at LaSalle Park

The occurrence of several large oak trees and a provincially rare grass species at LaSalle Park is locally significant, although not sufficient to justify inclusion of the park as an ESA (see section 3.3.10). The City of Burlington Parks and Recreation Department should be made aware of the heritage value of these trees, and the location of the rare grass that occurs there, so that the information can be incorporated into park management plans.