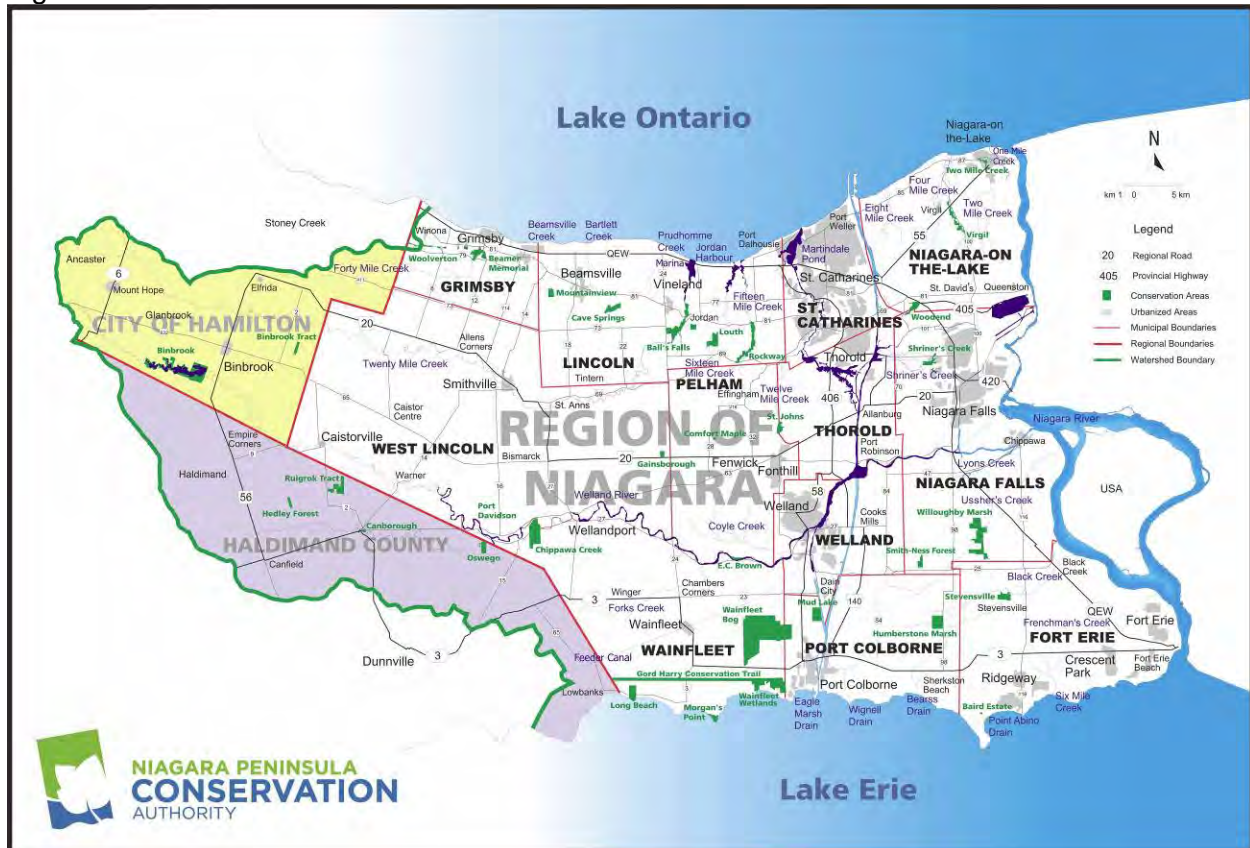


# 1.0 Executive Summary

The Niagara Peninsula Conservation Authority watershed jurisdiction covers an area of 2,424 square kilometres encompassing the entire Niagara Region, 21% of the City of Hamilton, and 25% of Haldimand County (see Figure1).

Figure 1



The Niagara watershed is approximately 15% urban, based on municipal planning urban area boundary data. The Places to Grow Built Boundary estimates that 11% of the watershed is built, and the Southern Ontario Land Resources Information System (SOLRIS) identifies 11.9% of the landscape as ‘built up’ area but includes land uses such as rural residential areas as well.

## 1.1 The Need

Those who have spent time in the natural areas in and around Niagara, Hamilton and Haldimand know that this part of the Province, with its Carolinian heritage and proximity to the Great Lakes, is a treasure trove of natural wonders. However, a comprehensive inventory of these natural areas was lacking. The only formal documentation for planning purposes in Niagara prior to this NAI dates back to 1980 (a joint project of the Region of Niagara and Brock University).

A Natural Areas Inventory for Haldimand–Norfolk was completed by the Norfolk Field Naturalists and their partners in 1987.

The Hamilton area of the watershed was inventoried on two separate occasions by the Hamilton Naturalists Club and their partners. The first inventory was completed in 1993 and the second known as the Nature Counts Project was completed in 2003. They are currently planning their third inventory for the Hamilton area.

In an attempt to increase community awareness and build a database for use by government agencies, consultants, the naturalist community, and the general public; local naturalist clubs and municipalities teamed up with the NPCA to undertake this Natural Heritage Areas Inventory.

As will be further described in the following Physical Characterization Reports, the study area is home to plentiful natural resources and interesting ecological communities. The watershed is one of the most complex in the province. It includes land drained by major tributaries such as the Niagara River, Twenty Mile Creek, and the Welland River. Further drainage by the Welland Canal creates unique challenges. With our proximity to both Lake Erie and Lake Ontario, the Niagara Peninsula has truly exceptional climatic and biotic zones that are unlike anywhere else in North America.

## **1.2 Natural Areas in the Study Area**

Based on the current status of the Community Series Fabric, 27.6% of the Niagara Watershed is mapped as natural area. A breakdown of these areas by common features such as wetland, wooded and successional area is detailed in the ELC Community Series Fabric mapping high level analysis and accompanying Community Series Analysis report.

The Community Series mapping covers the entire watershed jurisdiction of the Niagara Peninsula Conservation Authority. The field verification covers most of the watershed with the exception of; Hamilton which was inventoried through the previous work of the Hamilton Naturalists Club, and the Town of Fort Erie which was covered under their Official Plan update in 2005. The Niagara Escarpment Area has had extensive inventory work in recent years and thus was not a focus of the field verification of this NAI.



## **1.3 Project Design**

### **1.3.1 Goal – The purpose of the project was to use industry standard, scientifically-defensible protocols to inventory all of the natural areas in our watershed.**

The data collected through the NAI has provided a solid resource of information that will be of tremendous benefit in the development of greater environmental awareness; will help prioritize restoration opportunities; and serve as a critical baseline for use in future planning decisions, and policy development.

The data collected has built on existing information using a team of professional biologists and expertly trained volunteer teams, ultimately confirming the significance of known sites and filling information gaps where inventory work was outdated or lacking.

Our strategy for data collection involved the classification of vegetation communities through aerial photo interpretation and field verification. In addition, specialized consultants were employed to study sites of higher diversity in greater detail including the faunal components of those sites (birds, butterflies, and herptiles).

### **1.3.2 Objectives**

- 1 – The first objective involved the completion of Community Series (ELC) mapping for the entire watershed jurisdiction.
- 2 – The second objective was to field verify the Community Series Classification and refine the data on the vegetative communities to Vegetation Type (ELC).
- 3 – The third objective was collection of data on specific flora and fauna of the study site. These inventories included birds, lepidoptera and odonata, herpetofauna, lichens and the reports can be found in the second volume of the final report.
- 4 – The fourth objective was to educate the project partners and public about the findings of the NAI.

### **1.3.3 Our strategy for data collection was three fold:**

- 1- Desktop Analysis: using 2006 colour, digital air photos with 10cm resolution, the project team classified the entire watershed to Ecological Land Classification (ELC) – Community Series. The Ontario Wetland Evaluation System protocol (OWES) was also employed through a partnership with the Ministry of Natural Resources (MNR) to delineate and evaluate all core wetlands within the study area.
- 2- Ground Truthing: a field crew trained in both Ecological Land Classification (ELC) and Wetland Evaluation (OWES) performed assessments on all natural areas where access was permitted by the landowner. ELC was taken to the most detailed level of Vegetation Type. Where Species at Risk were encountered, data was collected and shared with the Natural Heritage Information Centre and local MNR staff. Data collected on wetlands was shared with the MNR for their evaluation.
- 3- “Bio Blitz” Events: using specialized consultants, select areas of high diversity were inventoried in greater detail. This includes fauna such as: birds, butterflies, and herptiles.



#### **1.4 End Products**

The end products for this project are Community Series mapping for the entire watershed jurisdiction; a two volume report similar to the Nature Counts Project (Hamilton NAI) where the first volume is made up of the technical summaries for each site visited and ground truthed; and the second volume contains the species checklists, and a master plant list including, a list of local rarity compiled by the Natural Heritage Information Centre of the Ministry of Natural Resources.

Our field teams along with a group of Geographic Information System (GIS) Specialists have inputted the data collected into the project database (more than 92,000 data points).

Brock University has provided in-kind support for the project by developing the project bibliography.

The Royal Botanical Gardens has been extremely helpful in flora identification, and the housing of thousands of specimens generated by the project.

#### **1.5 Project Implementation**

The project began with a Terms of Reference presented to the Conservation Authority Board of Directors in late 2005. With Board approval the General Manager of the NPCA approached the Region of Niagara for funding. Building on the Official Plan Review of the Region of Niagara, the NPCA hoped to update the baseline data for use in future reviews, and in the planning process.

The Peninsula Field Naturalists (PFN) joined the project as the collaborative partner of the NPCA for fund raising and project design. A representative of the PFN sits as the Chairman of the Steering Committee.

Work began in April of 2006 with the hiring of the Project Coordinator, initiation of the landowner contact process, development of project committees, and the hiring of field staff. The GIS team of the NPCA began the Community Series mapping in the summer of 2006, a process that continued throughout the three and a half years of the project. The QA/QC (quality

assurance/quality control process of this deliverable carried on after publication of this document.

The Ecological Land Classification (ELC) field teams began collecting data in July of 2006 along with an expert volunteer team. Additional teams were added in the two subsequent years in an effort to cover the volume of positive landowner responses received.

Consultants with expertise in the fields of Botany, Entomology, Lichenology, Ornithology, Herpetology, Geology, and Ecology were hired with the bulk of the inventory work taking place in the summer of 2007.

Data entry began in late 2007 and carried on until the spring of 2009 at which time the Project Coordinator began writing the 107 technical summaries, and editing the contributors papers for the final report.

### **1.5.1 Management Team**

Coordinator of Watershed Planning for the NPCA – Suzanne McInnes  
Project Coordinator, NPCA- Deanna Lindblad (2006, 2008, 2009), Brianne Wilson (2007)  
Coordinator of GIS Services, NPCA – Geoff Verkade  
Chairman of the Steering Committee – Roman Olszewski, Peninsula Field Naturalists.

### **1.5.2 Field Crew**

ELC Technician/Crew Leaders- Albert Garofalo,  
Tom Staton, Ryan Kitchen, Kasondra White

Field Technicians: Roselei Ng, Barry Porter, Said  
Mohamed, Katleya Young-Chin

Specialized consultants in the fields of botany,  
ornithology, herpetology and entomology.

### **1.5.3 Project Committees:**

Steering Committee – This committee helped to guide the program and ensure that the interests and concerns of all project partners and funders were met. Their responsibility was to oversee the communications aspect of the project and monitor progress. This committee was made up of representatives of project funding partners and concerned agencies.

Technical Committee – This committee was responsible for overseeing the collection, management, and dissemination of data. This committee was made up of representatives from local naturalist clubs, government agencies, and the academic community.

Implementation Committee – The purpose of this committee was to comment on the implementation of the project and identify any new areas of interest. This committee consisted of a vast cross-section of watershed stakeholders. They were consulted throughout the process and updated at project milestones.



## **1.6 METHODOLOGY**

### **1.6.1 Site Selection – Landowner Contact**

The goal of site selection was to document a representative sample of as many communities as possible throughout the study area. For this reason, an effort was made to not narrow the scope of the landowner contact process knowing full well that response from the landowners would be the greatest constraint (see landowner letter in Appendix).

In the first year of the project, a workshop was held with possible project partners and stakeholders to brainstorm ideas around project design, site selection, and a communications strategy for the project. Workbooks were handed out to the nearly 60 participants. 24 of these were returned and a summary was produced to capture all of the comments submitted (see Workshop Summary Report in Appendix).

The landowner contact program was designed to inform landowners about the project and solicit consent to access their properties for the purpose of the Ecological Land Classification Vegetation Type assessment.

In the first year, 2006, the municipalities of Port Colborne and Wainfleet were targeted. These areas were chosen first due to the fact that the Ministry of Natural Resources had completed the updates to the draft wetland mapping for these municipalities.

There was no scoping for site selection in this first year. 2200 letters representing 2700 properties were sent to landowners that had natural area or wetland on their properties regardless of size, based on a desktop GIS exercise.

Of the 2200 letters sent, 590 (27%) responses were received. 536 (24%) were positive and 54 (3%) were negative. 81 were returned unopened.

With one field crew and one team of volunteers, 62 sites were visited in this first year.

In the second year of the project, 2007, the portion of Haldimand County that falls within the study area was targeted along with South Niagara Falls. The Steering Committee decided that further scoping was required due to the large volume of properties. 3475 letters representing 4385 properties were sent to landowners with natural area greater than two hectares, or draft MNR wetland based on a desktop GIS exercise.

Of the 3475 letters, 870 (25%) responses were received. 792 (23%) were positive, and 78 (2%) were negative. 111 were returned unopened.

With two field crews and two volunteer teams in this second year, 268 sites were visited.

In the third year of the project, 2008, the municipalities of Pelham, Thorold, Welland, North Niagara Falls, and West Lincoln were targeted for landowner contact. 2829 letters representing 7135 properties were sent to landowners with natural area greater than two hectares in size, or wetland.

Of the 2829 letters sent, 1233 (44%) responses were received. 1036 (37%) were positive and 197 (7%) were negative. 145 were returned unopened.

With three field crews and two teams of volunteers, 197 sites were visited.

During the course of the project, a total of 8504 letters were sent to landowners representing 14,220 properties throughout the study area. 2693 (32%) responses were received. Of those, 2364 (28%) were positive and 329 (4%) were negative.

A total of 337 letters were returned unopened.

Field crews and volunteer teams visited a total of 527 sites representing 22% of the sites that were available to us through positive landowner responses.

It is obvious to the project management team that the citizens of our watershed are very supportive of our efforts to document the natural spaces of their properties. Further study of the privately-owned natural areas is recommended.

### **1.6.2 Wonderful Volunteers**

Committed volunteers spent more than 180 hours over the course of the nearly four years of the project in Committee meetings. Their input has been essential in developing the program and adapting the project design to meet the changing needs of implementing a project of this size.

In the field, teams of expert volunteers comprised of members of the three local naturalist clubs spent more than 1500 hours collecting data on 70 sites to add to the ever growing body of knowledge about the natural areas of our watershed. Without their expertise and dedication, we would not have been able to cover as much ground as we did, or reach as many willing landowners. They were diligent in their data collection and record keeping, and wonderful ambassadors for the program with the landowners.



## **1.7 Methodologies**

### **1.7.1 Ecological Land Classification (ELC)**

Ecological Land Classification (ELC) is an integrated approach to surveying and classifying land and resources in order to “identify recurring ecological patterns on the landscape to reduce complex natural variation to a reasonable number of meaningful ecosystem units” (Bailey et al. 1978 in Lee et al, 1998). Provincially, the goal has been to “establish a comprehensive and consistent province-wide approach for ecosystem description, inventory and interpretation” (Lee et al.,1998).

The key focus of ELC is to improve our ability to manage both natural resources and the information about those resources. The ELC provides community descriptions and sampling methodologies for identifying and mapping valuable natural heritage features and areas at varying scales.

The six nested approach of the ELC for Southern Ontario blends the ability to put landscape units into a spatial context with the ability to understand their community-related organization. The nested levels range from the Site Region to the System to the Community Class, the Community Series, the Ecosite, and the Vegetation Type (see Figure 2).

Figure 2



### 1.7.2 Data Entry and Compilation

All data collected through this project was entered into a copy of the MNR ELC Data Management System (v 4.0) Microsoft Access database (ELC database). This database was one of two freely available that the team was aware of in the province to store, catalogue, and report on ELC data. The MNR database was chosen due to a number of reasons highlighted by the facts that it appeared to possess more robust reporting capabilities, and was tightly associated (commissioned by) the Southern Ontario ELC protocol First Approximation author, Harold Lee.

The primary data elements collected to support ELC are not unique and exist in support of a variety of field collection methods. For example, most natural area field survey work, whether ELC or not, will generally provide plant and wildlife species lists, some kind of stand description, and some form of soils information. As a result, this project also endeavoured to use the NAI

ELC database as a repository for other local field data collected under other protocols and initiatives in order to start to centralize all natural area information for Niagara in one enduring information system.

Generally this worked very well, as most data elements from the inventory work conducted by the NAI and other methods translated into the database reasonably well. The main advantage of this is that now, unique plant lists and other reports for each natural area can be generated based on all information collected for that geography, whether it was ELC through the NAI, or for example, a supplemental plant list based on a recent EIS. This is also important in the instance that plant lists will slightly differ with the timing of site visits.

Supplemental information entered into the project database included:

- select Environmental Impact Statements from the Niagara Peninsula Conservation Authority and the Region of Niagara between 2000 and 2006,
- Ontario Power Generation Biodiversity Study Reports including DeCew Generating Station, Sir Adam Beck Complex, and Welland River and Power Canal Natural Areas Studies,
- Ontario Ministry of Natural Resources select Area of Natural and Scientific Interest Reports,
- incidental flora and fauna data collected by consultants during the Natural Areas Inventory,
- plant lists and incidental wildlife observations collected by project volunteer teams during the Natural Areas Inventory,
- Environmentally Sensitive Areas information from the Region of Niagara.

### **1.7.3 Natural Area Sites and the Organization of Management Units**

In order to organize, report on, and catalogue all of the field survey data in the tabular ELC database, the natural areas on the landscape had to be broken down and grouped into a standard framework of management units. The survey data within the ELC database had to be organized with some sense of geography as well, and hence standard management units or 'study sites', were established to catalogue surveys with geographic reference based on the criteria detailed below.

Study Sites were first delineated based on the occurrence of ANSI, ESA and/or Evaluated Wetlands that constituted a core area of natural cover. Remaining natural areas that were adjacent and proximal were added as determined by;

- surface water connections (riparian corridors, headwater areas, subwatershed membership),
- coincide with physiographic and topographic features (beach ridges, dunes, escarpments, moraines);
- and natural occurrence of corridors that connect core areas (hedge rows, successional areas between cores).

Arbitrary breaks used to further delineate a site were agricultural fields, rail lines, roadways, urban or industrial areas, and on occasion successional natural areas as the natural breaks between cores (when natural area connectivity spanned large areas, i.e. riparian habitat along the Welland River which can be contiguous from West Lincoln all the way to Niagara Falls).

Due to the robust reporting capabilities of the ELC database, where sites could be nested within other sites, and where unique plant lists and other reports could be produced at all of these different site levels, a standard hierarchy or organized framework of sites was developed. The site at the top of the hierarchy tree is referred to as the 'primary' site which is synonymous with the natural area 'site' terminology and the reporting unit for this project.

Sites were broken down into their contiguous core areas or 'Tracts' which form the next level of detail and geographic reference for field survey data. From there, tracts could be conceptually divided into blocks (units that share boundaries with each other within a tract) which could be based on any number of requirements, such as different communities, and survey method types. Different ELC Vegetation Type communities discerned through the ELC field survey data were stored at the Block level, as were the extents and associated field data for other surveys such as communities identified through an EIS, or the boundaries within a tract that a volunteer team had produced species lists for.

The entire NAI Primary Site hierarchy framework is conceptualized below and uses the following coding convention:

**Primary Site – Natural Area 'Site' – PC-01**

**Sub-Site Level 1 – Natural Area 'Tract' – PC-01-01**

**Conceptual Sub-Site Level 2 – Natural Area 'Block' - PC-01-01-01-XX-XX**

**Specific Sub-Site Level 2 – Natural Area ELC Veg Site - PC-01-01-xx-xx-01**

#### **1.7.4 GIS Methodology for Delineation of the Community Series Polygons**

The Community Series polygons which form the new natural areas base mapping and form a spatial framework for the NAI, were predominantly mapped through the interpretation of digitally captured colour aerial photography technically referred to as orthoimagery. Niagara Region and Haldimand County air photos were both produced in 2006, with 10 and 30 cm ground pixel resolutions respectively, while the City of Hamilton was from 2007 at 20 cm resolution. The digital capture technology used for these datasets, as opposed to the traditional film based approach, produces better quality photography in terms of clarity, colour and crispness which has been of tremendous value to the natural area identification and classification process. With Niagara constituting 77% of the study area, the majority of the watershed mapping was also able to benefit from the added detail afforded by the very fine 10 cm resolution imagery which was the first of its kind within the province.

The Community Series polygon 'fabric' is therefore a large scale mapping product with an intended mapping scale of 1:2000. It was designed to meet a number of business drivers and application needs that require natural area information to be reasonably representative of what is on the ground, or on site when looking at the information in the context of a collection of several, or even a single parcel. This would also facilitate the production and integration of the detailed Vegetation Type mapping coming from the field survey efforts by providing a detailed spatial framework.

Geometry for the Community Series polygons was digitized with linework generalized to the target scale of 1:2000. This was accomplished by ensuring that natural area features were captured at operating scales on average of 1:500 and of no greater than 1:1000. In addition, when digitization was performed in 'streaming' mode a stream tolerance of 2 m was used to ensure a coordinate pair or 'vertice' spacing that would support the desired map generalization. Stream digitizing is similar in concept to using the mouse pointer like a pen as opposed to capturing a single vertice at a time with each click.

A minimum mapping unit of 0.1 hectare was implemented as a guideline for the capture of natural area features. This value was established by assuming the difference in the order of magnitude from 1:2000 to traditional medium 1:10000 scale data like the OWES wetlands which generally uses a larger 0.5 hectare threshold.

As a result, areas greater than or equal to 0.1 ha of homogeneous cover or highly variable cover consisting of a relatively even distribution of multiple individual representative communities functioning as a 'complex' were mapped as individual Community Series polygon mapping units. There are polygons within the fabric that are smaller than the minimum mapping unit guideline and these were generally a result of capturing forest and successional areas around OWES wetlands where controlling the size of that remaining natural area to be captured could not be avoided (i.e. a wetland that does not persist to the edge of the woodlot leaving a 5 m wide sliver which then extends into a small hedgerow).

The wetland polygon mapping from the MNR OWES was integrated to reduce the need to interpret a duplicate set of wetland extents within the Community Series fabric through ELC. This was accomplished by simply building around and off of the delineated wetland polygons (geometry was never edited) as alluded to in the previous paragraph, as the province made them available. Although traditionally more of a 1:5000 or 1:10,000 scale dataset, the new draft and evaluated wetland extents provided by the MNR were also being delineated with a higher degree of spatial resolution and detail due to the high quality of the orthoimagery. As a result, the MNR wetlands were readily incorporated and although mapped with courser criteria in terms of minimum mapping unit than the rest of the Community Series polygons, it produced a consistent fabric.

In the case of most forest and woodland community types, the vector SOLRIS Phase 1 wooded area data was used as starting geometry to save excessive and unnecessary digitizing. This mapping was corrected, reshaped, refined, and split to meet the large scale mapping requirement, and to apply the Community Series classification or complexing as it was worked into the fabric.



The NAI site hierarchy is also conceptualized in the fabric. Each community series polygon is tagged with its site and tract codes. Displaying the data thematically by these attributes visualizes the framework used to organize the ELC database.

All data in the final polygon fabric has gone through an initial capture phase and several rounds of QA/QC to ensure attribute completeness and correct topology. These measures will ensure that use of this mapping information in analysis is highly reliable.

### **1.7.5 Wetland Evaluation Methodology of the Ministry of Natural Resources**

A clear understanding of what is required at each site should be established prior to going into the field. This understanding is achieved primarily through interpretation of aerial photographs. The following is the methodology followed by MNR to evaluate wetlands.

- Step 1: Identify Priority Areas (Data Gaps, SAR)**
- Step 2: Air Photo Interpretation - Initial mapping**
- Step 3: Background Checks**

All wetland boundaries and complexes are established prior to the wetland field visit using 2006 colour ortho-photography. The areas are compared to older black and white aerial photography as well as the Ministry of Natural Resources GIS digital elevation contour layer to distinguish wetlands from non-wetlands.

1. Field photos and maps are produced showing the wetland boundaries within each property
2. Preliminary routes are then established to maximize time and efficiency in viewing the vegetation and boundaries of the wetland polygons.

### **3. Wetland Boundaries**

One of the most important tasks in the entire evaluation is the accurate location and mapping of wetland boundaries. Evaluators must develop a full understanding of both the criteria for distinguishing wetlands from non-wetlands and also the methods of mapping and measurement. Where boundaries are not obvious, all decisions regarding boundary location should be justifiable and fully documented. The outer boundary of a wetland (which determines its size) is the one which will be used in several key aspects of the evaluation. However, several internal boundary lines must also be drawn although the degree of accuracy is not as critical. Internal boundaries are those between the four wetland types and between vegetation communities. The evaluation team will often find that wetland boundaries have to be drawn across a zone of gradual ecological change. The general rule for locating the boundary in such cases relies on the species composition of the plant community. It is absolutely essential that the evaluator be able to distinguish wetland from upland plants. **The wetland boundary is drawn where 50% of the plant community consists of upland species.**

#### **Step 4: Initial evaluation (desktop)**

#### **Step 5: Field Check**

### **4. Field Evaluation**

During the site visit the following information will be collected or refined:

1. Wetland outer boundaries;
2. Boundaries between wetland types;
3. Vegetation forms/communities;
4. Ascertain directions of drainage;
5. Check quality and authenticity of existing information;
6. Search for rare plant and animal species;
7. Detect signs of presence of furbearers, wild rice, etc.
8. Note evidence of disturbances, hunting, fishing, nature appreciation, etc.
9. Record fisheries habitat information;
10. Check soil types;
11. Search for seeps and marl deposits.

Boundary refinements will be noted on field photos to update mapping in the office and where possible GPS coordinates will be taken for specific plant/animal and community locations.

## 5. **Timing of Field Visits**

The timing of visits to each wetland will depend upon the season, type, size and complexity of the wetland and the amount of information that is already available. If the wetland contains permanent open water, then one or more visits will be essential during the summer or early fall to obtain data on the extent and nature of submergent and floating vegetation as well as on the hydrological characteristics. All palustrine wetlands will have to be visited during the low water stage to determine surface inflow and outflow. The characteristics of a wetland at any particular time of year are often governed by seasonal rainfall. Some wetlands are so complex that the evaluation team will need to exercise considerable judgement in determining the timing and the date(s) of field visits. The aim in all cases is to ensure that the Wetland Data Record is as accurate, objective and complete as possible so that the conclusions drawn in the evaluation will stand up to independent verification.

### **Step 6: Review Mapping and Complete Scoring**

The evaluation is conducted at a point in time. Hence, it is the conditions described and facts noted at that time that are assessed within the context of all available information.

Where information is not available, this should be noted; the data record should be updated as information becomes available, making certain that all copies of the evaluation are simultaneously updated as well.



### **Step 6a: Regional/Municipal review**

### **Step 7: Final Review and Check (Area Biologist Signs off)**

### **Step 8: Update NRVIS layer and Mapping (District Level)**

### **Step 9: Update Land Information Ontario (LIO), Update Conservation Land Tax Incentive Program (CLTIP)**

### **Step 10: Send letter (notification of wetland update completion and status) to Regional Municipality. Region to provide lower municipality with current information**

### **Step 11: Final Product Delivered to Niagara Peninsula Conservation Authority**

***The evaluation always remains as an open file, subject to change as more information becomes available or as a consequence of changes to the wetland itself.***

## 1.8 Project Funding

The project was funded by the Regional Municipality of Niagara, Haldimand County, Ontario Trillium Foundation, EJLB Foundation, Niagara Community Foundation, Great Lakes Sustainability Fund, Ministry of Training Colleges and Universities, and the Peninsula Field Naturalists.

<b>Funding Partners</b>	
<b>Cash Donations</b>	<b>TOTAL</b>
Region of Niagara	\$ 480,000
County of Haldimand	\$ 15,000
Ontario Trillium Foundation	\$ 100,000
Great Lakes Sustainability Fund	\$ 210,000
Niagara Community Foundation	\$ 5,000
ECO Canada	\$ 7,710
The Maclean Foundation	\$ 5,000
Ontario Ministry of Natural Resources – CFWIP	\$ 2,500
EJLB Foundation	\$ 30,000
Species at Risk Stewardship Fund	\$ 22,170
Ontario Ministry of Training Colleges and Universities	\$ 49,723
ELC training revenue	\$ 1,487
<b>Total</b>	<b>\$ 928,590</b>

<b>In-Kind Donations</b>
Ministry of Natural Resources
Ministry of Environment
Peninsula Field Naturalists
Haldimand County
LandCare Niagara
<i>Volunteers</i>
Naturalist Clubs Inventory Group (Niagara Falls Nature Club, Peninsula Field Naturalists, Bert Miller Nature Club)

## 1.9 Project Results and Recommendations

- 31 different Community Series under Ecological Land Classification were documented through this project (See full list of Community Series found in Appendix);
- approximately 687 sq km of natural areas were mapped at a large 1:2000 scale;
- 240 different Vegetation Types under Ecological Land Classification were documented through this project (See full list of Vegetation Types found in Appendix);

- Species at Risk and Provincially Rare Species of flora have been documented by study site and element occurrences shared with Natural Heritage Information Centre and the local MNR SAR Biologist;
- the most common Vegetation Type documented for the watershed was Red Maple Mineral Deciduous Swamp;
- over 92,000 data points can be found in the project database;
- established a preliminary information management framework for natural area data within Niagara that has tremendous potential for future improvement into an enduring information system with better technology solutions as resources permit further study required of areas with high biodiversity;
- depending on specific objectives, future inventory work should consider different ELC sampling scales (polygon, or plot) and different levels of effort (reconnaissance, survey, and research) to maximize use of resources;
- future inventory work should also consider performing a portion of Vegetation Sampling Protocol strategically across the study area to support the predictive modelling of vegetation mapping where landowner access and traditional field data collection can not be performed en route to eventually having vegetation level mapping across the watershed;
- further study is recommended in areas where there was positive response from landowners but teams were unable to visit due to time constraints;
- manual data entry costs are exorbitant, both financial and in the context of time, and future inventory work should collect data through the use of hand held mobile devices, scannable forms or some other digital solution that integrates well or even interfaces through the web directly with the database so that project dollars can be maximized on data collection;
- while this inventory is a tremendous update on the current status of natural areas in Niagara, spatial information about the landscape's reference condition is still largely inferred and measures such as spatial pre-settlement vegetation mapping with which to compare and understand this existing state of the current natural environment should be pursued;
- an information strategy for the project's data should be completed and geared towards delivery of the information via the web so that the project partners and the public can fully appreciate its value, benefit from its use, and potentially continue to contribute to the information base;
- the ELC database has sufficed for the information compilation needs of this project but is not a long term solution for future access to the data as there is no way of controlling which users can and cannot edit the values within. An information management strategy and an alternative solution for all of the NAI data products, particularly the field data stored in the database is highly recommended. Any potential solution should also

investigate integrating the spatial mapping and tabular ELC data into the same environment.

### 1.10 Significant Species

The project Technical Committee chose to report of significant species with the highest status ranking that would be consistently applied to private property. The best resource is the Ontario Ministry of Natural Resources, Species at Risk Section, Species at Risk in Ontario list.

In addition to provincially designated Species at Risk that were found, those floral species that are provincially rare or regionally rare were also documented. (See list of Regionally Rare Species in Appendix).



## 1.11 Final Report Format

The final report for this project follows quite closely the format of both the Nature Counts Project of the Hamilton Naturalists Club, and the Halton Natural Areas Inventory. Two volumes have been produced.

**Volume 1** contains:

- Physical Characterization
  - geology (B. Murphy),
  - hydrology/ hydrogeology (J. Campbell),
  - soils
  - Community Series Analysis (NPCA)
- Significant Communities Report (A. Goodban)
- Vascular Plant List (NHIC)
- List of Locally Rare Vascular Plants (NHIC)
- Technical Summaries (107)

### **Outline of Technical Summaries Format**

#### **Municipality**

Lists the municipality in which the majority of the study site is located. Many study sites straddle the borders of two or more municipalities.

#### **Formerly**

Where appropriate, the study site codes and names found in this report are the same as those used in the 1980 Brady, et al. report name, or ANSI reports, or EIS reports.

#### **Approximate Area**

Refers to the approximate area of the study site in hectares.

#### **Watershed**

Refers to the watershed in which the majority of the study site is located. Many study sites straddle two or more subwatersheds.

#### **Ownership**

Differentiates the majority of the ownership of a study site excluding road and utility easements.

#### **General Summary**

General description of where the study site is located including the north, south, east and west boundaries (usually roads).

#### **Physical Description**

Outlines the basic physiographic and geologic features of the study site.

#### **Soils**

Soil types are listed alphabetically and percentages are given for the overall study site based on the 1989 OMAF, regional soils report.

#### **Ecological Land Classification**

##### **Summary**

Describes the dominant ELC Community Series and Vegetation Types including the dominant species in each vegetation layer.

##### **Vegetation Communities**

Lists alphabetically the ELC Community Series and Vegetation Types documented for the study site.

### **Significant Flora**

Lists alphabetically the significant species of vascular plants noted for the study site. Each species is listed only once based on its highest ranking i.e. Species at Risk Provincially, or Provincially Rare Species.

### **Points of Interest**

Highlights any interesting field finds within the study site.

### **Faunal Records**

Lists number of records noted (not necessarily unique) for the study site for each of the listed taxa groups.

### **Recommendations**

Outlines any study site specific recommendations made by the NAI team based on field noted or local knowledge.

### **Site Visits**

Lists all site visits with data entered into the project database. Includes date of site visit and name of observer(s).

### **% of site visited**

Gives an approximate percentage of the overall study site visited by NAI teams from 2006-2009.

### **References Cited**

Lists any references used to develop the study site technical summary.

### **Mapping**

A visual representation of the study site depicting the general location, study site boundaries and tract codes.

### **Volume 2 contains:**

#### **Species Checklists:**

- Birds of the Niagara Region, J. Black, K. Roy,
- Reptile and Amphibian Study 2006-2008, Ontario Ministry of Natural Resources, (A. Yagi, R. Tervo, A. Brant), Land Care Niagara
- Lichens and Bryophytes of Niagara, R. Olszewski
- A Preliminary List of the Butterflies (Lepidoptera) of Niagara Region, Ontario, R. Curry
- A Preliminary List of the Dragonflies and Damselflies (Odonata) of Niagara Region, Ontario, R. Curry

### **References Cited**

Lee, H. T., W. D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, South Central Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

