Port Union Waterfront Park Study Area

Terrestrial Biological Inventory and Assessment

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1.0 Introduction

Improvements to the shoreline of the Port Union Waterfront Park began in 1999 and are expected to be completed by 2012. The shoreline, which was once heavily eroded, has since been reconfigured with a series of headland beach systems designed to both protect it from further erosion and to maintain the current coastal processes. In order to provide safe public access to the waterfront, the enhancement efforts along the waterfront corridor extended to include the development of two pedestrian tunnels and a multi-use trail system. A bridge connecting the Highland Creek trail (south of the railroad) with the Port Union waterfront Park improvements has also been constructed.

In 2007 and 2009 the Toronto and Region Conservation Authority (TRCA) conducted field work to determine the effects that these enhancements along the Port Union Waterfront Park have had on the natural terrestrial system and *provide site-specific advice on management strategies taken in the future.* In order to provide this advice, detailed field work was undertaken to *characterize the terrestrial natural heritage features* of the Port Union Waterfront Park Study Area. Through the completion of this characterization, the site features can then be understood within the larger regional context of the Terrestrial Natural Heritage Program of the TRCA. The question that the inventory addresses is "*How does the area surveyed at Port Union Waterfront Park Study Area fit within the regional and watershed natural system, and how should its contribution to this system be protected and maximized?"* The important underlying message offered by this question is that the health of the natural system is measured at the regional scale and specific sites must be considered together for their benefits at all scales, from the site to the larger system. This report presents a detailed compilation of all fauna and flora inventory data collected for the Port Union Waterfront Park Study Area primarily in 2007 and 2009. Pre-existing flora data from 1997, 2002 and 2005 has also been incorporated into the report to provide relevant background information.

1.1 TRCA's Terrestrial Natural Heritage Program

Rapid urban expansion in the TRCA jurisdiction has led to continuous and incremental loss of natural cover and species. In a landscape that probably supported 95% forest cover prior to European settlement, current mapping shows that only 17% forest and wetland cover remains. Agricultural and natural lands are increasingly being urbanized while species continue to disappear from a landscape that is less able to support them. This represents a substantial loss of ecological integrity and ecosystem function that will be exacerbated in the future according to current urbanization trends. With the loss of natural cover, diminishing proportions of various natural vegetation communities and reduced populations of native species remain. Unforeseen stresses are then exerted on the remaining flora and fauna in the natural heritage system. They become even rarer and may eventually be lost. This trend lowers the ability of the land to support biodiversity and to maintain or enhance human society (e.g. through increased pollution and decreased space for recreation). **The important issue is the *cumulative* loss of natural cover in the TRCA region that has resulted from innumerable site-specific decisions.**

In the late 1990s the TRCA initiated the Terrestrial Natural Heritage Program to address the loss of terrestrial biodiversity within the jurisdiction's nine watersheds. This work is based on two landscape-level indicators: the quality distribution of natural cover and the quantity of natural cover. The aim of the program is to create a conservation strategy that both protects elements of the natural system (vegetation communities, flora and fauna species) *before* they become rare and promotes greater ecological function of the natural system as a whole. This preventive approach is needed because by the time a community or species has become rare, irreversible damage has often already occurred. A healthy natural system capable of supporting regional biodiversity in the long term is the goal of the Terrestrial Natural Heritage Systems Strategy by setting targets – both short- and long-term (100 years) – for the two landscape indicators in order to provide direction in planning at all scales (TRCA 2007a, TRCA 2007b).

A target system that identifies a land base where natural cover should be restored is a key component of the Strategy. Although the objectives of the Strategy are based on making positive changes at all scales, the evaluation models were developed at the landscape scale using a combination of digital land cover mapping and field-collected data. Field-collected data also provides ground-level information in the application of the landscape models at the site scale. The two indicators and the targets that have been set for them are explained in Section 3.1. It is important to understand that habitat quality and distribution are interdependent. For example, neither well-distributed poor-quality natural cover nor poorly-distributed good-quality natural cover achieves the desired condition of sustainable biodiversity and social benefits across the watershed.

2.0 Study Area Description

The Port Union Waterfront Park Study Area is located along the shoreline of Lake Ontario, immediately to the east of the mouth of the Highland Creek, and extending east along the lakeshore as far as the Port Union Go Train station (Map 1 & 2). It consists entirely of the narrow strip of land between the railway line and the lake. The study area is part of a larger lakeshore beach system stretching west to East Point Park (1 km to the west) and east to the mouth of the Rouge River (almost 2 km to the east). Both to the east and west much of the shoreline consists of low, sandy bluffs. Natural cover within the study area is composed of narrow strips of thicket and treed habitat. The site straddles the boundary between the Iroquois Sand Plain and the Ajax-Whitby Clay Plain physiographic regions (Chapman & Putnam, 1984), and falls within the Carolinian floristic region, this being historically composed mostly of deciduous forest. The original soil of the site would have been a mixed till exposed along the low bluffs, with small areas of sandy beach. However, alterations first during the construction of the lakeshore railway line many decades ago and then lake-filling for park development in recent years mean that most of the site is now anthropogenic fill. There are some beach features, including a natural beach at the mouth of Highland Creek and engineered gravely beaches between armoured headlands in the newly developed park area between there and the public access tunnel at Port Union.

3.0 Inventory Methodology

A biological inventory of the Port Union Waterfront Park Study Area was conducted at the levels of habitat patch (landscape analysis), vegetation community, and species (flora and fauna) according to the TRCA methodologies for landscape evaluation (TRCA 2007c) and field data collection (TRCA 2007d). Habitat patch mapping was excerpted from the regional 2007/08 mapping of broadly-defined patch categories (forest, wetland, meadow and coastal) and digitized using ArcView GIS software.

A key component of the field data collection is the scoring and ranking of vegetation communities and flora and fauna species to generate local "L" ranks (L1 to L5); this process was initially undertaken in 1996-2000 and ranks are reviewed annually (TRCA 2010). Vegetation community scores and ranks are based on two criteria: *local occurrence* and the number of *geophysical requirements* or factors on which they depend. Flora species are scored using four criteria: *local occurrence*, *population trend*, *habitat dependence*, and *sensitivity to* impacts associated with *development.* Fauna species are scored based on seven criteria: *local occurrence*, *local population trend*, *continent-wide population trend*, *habitat dependence*, *sensitivity to development*, *area-sensitivity*, and *patch isolation sensitivity*. With the use of this ranking system, communities or species of *regional concern*, ranked L1 to L3, now replace the idea of *rare* communities or species. Rarity (*local occurrence*) is still considered but is now one of many criteria that make up the L-ranks, making it possible to recognize communities or species of regional concern before they have become rare.

In addition to the L1 to L3 ranked species, a large number of currently common or secure species at the regional level are considered of concern in the urban context. These are the species identified with an L-rank of L4. Although L4 species are widespread and frequently occur in relatively intact urban sites, they are vulnerable to long-term declines.

3.1 Landscape Analysis

The quality, distribution and quantity of natural cover in a region are important determinants of the species distribution, vegetation community health and the provision of "ecosystem services" (e.g. air and water quality, recreation, aesthetics) in that region.

Base Mapping

The first step in evaluating a natural system or an individual *habitat patch* is to interpret and map land cover using aerial photographs. The basic unit for the evaluation at all scales is the habitat patch in the region, which are then combined and evaluated as a system at any scale. A *habitat patch* is a continuous piece of habitat, as determined from aerial photo interpretation. The TRCA maps habitat according to four broad categories: *forest, wetland, meadow*, and *coastal* (beach, dune, or bluff). At the regional level, the TRCA jurisdiction is made up of thousands of habitat patches.

This mapping of habitat patches in broad categories is conducted through remote–sensing and is used in the evaluation of quality, distribution and quantity of natural cover. It should not be confused with the more detailed mapping of vegetation communities obtained through field surveys and that is used to ground-truth the evaluation (Section 3.2).

Quality Distribution of Natural Cover

The quality of each habitat patch is evaluated according to three criteria: *size* (the number of hectares occupied by the patch), *shape* (edge-to-area ratio), and *matrix influence* (measure of the positive and negative impacts from surrounding land use) (TRCA 2007c). A total score for each patch is obtained through a weighted average of the scores for the three criteria. This total score is used as a measure of the 'quality' of a habitat patch and is translated into a local rank (L-rank) ranging from L1 to L5 based on the range of possible total scores from three to 15 points. Of these L-ranks, L1 represents the highest quality habitat and L5 the poorest.

Species presence or absence correlates to habitat patch quality (size, shape and matrix influence) (Kilgour 2003). The quality target is based on attaining a quality of habitat patch throughout the natural system that would support in the very long term a broad range of biodiversity, more specifically a quality that would support the region's fauna Species of Conservation Concern (Table 1).

Table 1: Habitat patch quality, rank and species response

Size, Shape and Matrix Influence	Patch Rank	Fauna Species of Conservation Concern
Excellent	L1	Generally found
Good	L2	Generally found
Fair	L3	Generally found
Poor	L4	Generally not found
Very Poor	L5	Generally not found

In addition to the three criteria that make up the total habitat patch score, another important measure to consider in assessing habitat patch quality is forest interior, i.e. the amount of forest habitat that is greater than 100 m from the edge of the forest patch, using 100 m increments. A recognized distance for deep interior conditions occurs at 400 m from the patch edge. Such conditions are a habitat requirement for several sensitive fauna species.

Quantity

The *quantity target* is the amount of natural cover which needs to exist in the landscape in order to accommodate and achieve the quality distribution targets described above. The two targets are therefore linked to each other: it will be impossible to achieve the required distribution of natural heritage quality without the appropriate quantity of natural cover. The proportion of the region that needs to be maintained as natural cover in order to achieve the desired quality has been identified as 30%.

3.2 Vegetation Community and Species

Vegetation community and flora and fauna species data were collected through field surveys. These surveys were done during the appropriate times of year to capture breeding status in the case of amphibians and birds, and during the optimal growing period of the various plant species and communities. Vegetation communities and flora species were surveyed concurrently.

Brief site walks were carried out in 2002, and 2005 to identify sensitive flora species within. The latter visit specifically related to the waterfront trail alignment (Table 2). A 1997 survey of the larger area which encapsulated the site provided valuable historical data. Botanical field-work for the site was conducted in 2007 and 2009 (Tables 3 & 4). Vegetation community designations were based on the Ecological Land Classification (ELC) and determined to the level of vegetation type (Lee *et al*. 1998). Community boundaries were outlined onto printouts of 2007 digital ortho-rectified photographs (ortho-photos) to a scale of 1:2000 and then digitized in ArcView. Flora regional and urban species of concern (species ranked L1 to L4) were mapped as point data with approximate number of individuals seen. A list of all other species observed was documented for the site.

Fauna data were collected by the TRCA in June/July of 2007 and June of 2009. Surveys in the summer were concerned primarily with the mapping of breeding bird species of regional concern. As per the TRCA data collection protocol breeding bird surveys are carried out by visiting all parts of a site at least twice during the breeding season (last week of May to mid-July) to determine the breeding status of each mapped point. The methodology for identifying confirmed and possible breeding birds follows Cadman *et al*. (2007). All initial visits are to be completed by the end of the third week of June. The field-season is to be organized so that by late June only repeat visits are being conducted. It is imperative that any visit made in the first half of June is subsequently validated by a second visit later in the season. Fauna regional species of concern (species ranked L1 to L3) were mapped as point data with each point representing a possible breeding bird.

Table 2. Pre-existing survey data for Port Union Waterfront Park Study Area, 1997-2005

Survey Item	Survey Dates	Survey Effort
Flora Species	Sep. 1997/2002; 31 Mar. 2005	~10 hours

Table 3. Schedule of biological surveys at the Port Union Waterfront Park Study Area, 2007

Survey Item	Survey Dates	Survey Effort
Vegetation Communities and Flora Species	24 May; 1 Aug.; 5 Sep. 2007	8 hours
Breeding Songbirds	18 June and 13 July, 2007	3 hours

Table 4. Schedule of biological surveys at the Port Union Waterfront Park Study Area, 2009

Survey Item	Survey Dates	Survey Effort
Patch / Landscape	2007/8 orthographic maps	21 hours
Vegetation Communities and Flora Species	6 August, 2009	7 hours
Breeding Songbirds	3 and 18 June, 2009	2.5 hours

4.0 Results and Discussion

Information pertaining to Port Union Waterfront Park Study Area was collected through both remote-sensing and ground-truthing surveys. This information contains three levels of detail: habitat patch, vegetation community, and species (flora and fauna). This section provides the information collected and its analysis in the context of the TNHS Strategy.

4.1 Regional Context

Based on 2007 orthophotography, 25% of the land area in the TRCA jurisdiction consists of natural cover but this figure includes meadow and old field. Although historically, the region would have consisted of up to 95% forest cover, currently (i.e. 2007) only about 17% is covered by forest and wetland. Of the non-natural cover (i.e. the remaining 75 %), 45% is urban and 24% is rural / agricultural.

The regional level analysis of habitat patches shows that the present average patch quality across the TRCA jurisdiction is “fair” (L3); forest and wetland cover is contained largely in the northern half of the TRCA jurisdiction, especially on the Oak Ridges Moraine; and the quantity is 17% of the surface area of the jurisdiction (Map 3). Thus the existing natural system stands below the quantity target that has been set for the region (30%) and also has an unbalanced distribution. The distribution of fauna species of concern is also largely restricted to the northern part of the jurisdiction; fauna species of regional concern are generally absent from the urban matrix (Map 4). The regional picture, being the result of a long history of land use changes, confirms that all site-based decisions contribute to the condition of a region.

4.2 Habitat Patch Findings for the Port Union Waterfront Park Study Area

The following details the study area according to the two natural system indicators used in designing the Terrestrial Natural Heritage System Strategy: the *quality distribution* and *quantity* of natural cover. Analysis was based on 2007/8 ortho-photos.

4.2.1 Quality Distribution of Natural Cover

The results for quality distribution are reported below under the headings of habitat patch size and shape, matrix influence and total score.

Habitat Patch Size and Shape

The Port Union Waterfront Park Study Area consists of a long and very narrow strip of beach on the Lake Ontario shoreline, with very small patches of forest and scrub along the lake-ward side of the railway. Toward the east end of the site the land rises and presents a low sandy cliff along the shoreline, again with small patches of forest along the top of the bluff.

The largest forest patch is provided by a narrow strip of habitat along the railway at the west end of the site amounting to just 0.6 hectares, which scores as L5 or "very poor" for patch size. The small patch at the east end of the site is continuous with a larger patch that is largely off-site (this whole patch covers 2.1 hectares). The largest habitat patch is the 2.5 hectare strip of restored beach along the shoreline of the western half of the site.

Given the overall narrow linear shape of the study area it is surprising that the shape scores for the individual natural habitat patches range from "poor" for the beaches, to "good" and "fair" for the small forested patches (Map 5).

Habitat Patch Matrix Influence

Analysis based on the 2007/8 ortho-photos shows that the overall habitat in the study area is ranked as "good" for matrix influence (i.e. scores 4 out of a possible 5 points, Maps 6 and 7). This score is much higher than would be expected given the urban setting. It can be attributed to the proximity of the open waters of Lake Ontario; the lake is considered as exerting a completely natural matrix influence because it is not under urban or agricultural use.

The TRCA measures matrix influence at the landscape level by assigning set values; positive, neutral and negative, to the type of landscape use occurring within 2 km of the subject site. It is important, however, to also understand and consider the matrix influence that occurs at the site and patch level. Such influences include those transferred to an otherwise remote natural habitat patch from a distant urban or suburban development, for example via a trail system.

Habitat Patch Total Score

The combination of "good" matrix influence on the site, and the mix of "good" to "very poor" for habitat patch size and shape, results in an overall "poor" habitat patch quality (Map 8).

4.2.2. Quantity of Natural Cover

The surveyed area makes up 12.85 hectares of which 4.73 hectares are natural cover including 1.1 hectares of forest, 0.28 hectares of successional, and 3.36 hectares of beach and bluff.

4.3 Vegetation Community Findings for the Port Union Waterfront Park Study Area

4.3.1 Vegetation Community Representation

The study area supports 13 types of vegetation communities (Appendix 1; Map 9). These comprise of five dynamic coastal communities (one of which is strictly anthropogenic) and eight generally anthropogenic communities in various stages of succession. The coastal communities include three types of beach, including a natural sand beach at the mouth of Highland Creek with sea-rocket and seaside spurge (BBO1-1) and a more-or-less unvegetated sand and gravel beach toward the east end of the site (BBO1). This latter beach may disappear when lake levels are high.

The third beach / shoreline community is a new artificial feature produced by lake-fill between 2003 and 2006. It is an engineered feature extending from the access tunnel at Port Union west to the beginning of the natural beach at the mouth of Highland Creek. This Rubble Open Shoreline / Beach (BBO2-A) is composed of armoured headlands and somewhat more sheltered bays that accumulate cobble, gravel, and some sand. Before construction, much of this shoreline was a steep armoured embankment with shrubby vegetation descending directly from the railway line to the water.

The non-coastal communities on site are all disturbed and anthropogenic. Two are forest types: a Fresh-Moist Poplar Deciduous Forest (FOD8-1) along the western portion of the railway embankment that has some natural coastal characteristics, and a Dry-Fresh Exotic Deciduous Forest (FOD4-e) dominated by a mix of black locust (*Robinia pseudoacacia*), Norway maple (*Acer platanoides*), white poplar (*Populus alba*), and Siberian elm (*Ulmus pumila*). This, together with some White Cedar Cultural Woodland (CUW1-A1), Native Deciduous Cultural Woodland (CUW1-A3), and Exotic Cultural Woodland (CUS1-b) are all relicts of overgrown yards and gardens of houses that were formerly above the shore bluff until around the 1970s. They lie east of the Port Union pedestrian access tunnel, extending to the Port Union GO station. Although there is the abovementioned patch of Fresh-Moist Poplar Deciduous Forest, most of the railway embankment is best characterized as a shrubby Native Deciduous Cultural Savannah (CUS1-A1) with some Sumac Cultural Thicket (CUT1-1). Dog-strangling vine (*Cynanchum rossicum*) – a highly invasive exotic plant - is prominent in all of the railway embankment communities.

4.3.2 **Restoration Plantings**

At the base of the railway embankment is new lakefill, providing space for parkland as well as the Waterfront Trail. While a small portion is manicured the majority was seeded with grasses and clovers and planted with patches of native trees and shrubs. The newly-planted trees and shrubs overwhelmingly died during the dry summer of 2007, so the new fill is classified as cool-season grass meadow (CUM1-b) rather than plantation.

This area has since been replanted with young native saplings and shrubs. A recent visit in July of 2010 established that the new plantings are surviving and in some instances, thriving. These plantings, a mix of conifer and deciduous species, are intermittently distributed along the northern edge of the waterfront trail. The condition of the individual plantings is variable; those species that are suited to open and windy habitats are fairing the best. From the list of species chosen for the site, coniferous species, such as white-cedar (*Thuja occidentalis*) and deciduous species, such as cottonwood (*Populus deltoides*), trembling aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) are showing the most resilience. Shade tolerant species, such as sugar maple (*Acer saccharum ssp. saccharum*), and species typically associated with poorly drained soils, such as silver maple (*Acer saccharinum*); appear to only be tolerating the site conditions. Many of the latter two are stunted and showing signs of chlorosis. Chlorosis is a condition indicative of compacted and/or damaged roots as well as nutrient deficiencies and/or alkaline soil.

Aside from site conditions, the success of these plantings is being hindered by the rapid growth of weedy exotic plants such as field thistle (*Cirsium arvense*) and crown vetch (*Coronilla varia*) which are overcrowding the young trees and shrubs in many sections along the trail. In some instances, the plantings are completely overgrown and shaded out by the exotics. Photographs taken on July 19th, 2010 showing the state of the plantings within the site are presented in Appendix 4.

4.3.3 Vegetation Communities of Concern

The vegetation communities that occur in the TRCA jurisdiction are scored and given a local rank from L1 to L5. Vegetation communities with a rank of L1 to L3 are considered of regional concern in the jurisdiction.

The coastal communities at Port Union are all of regional concern due to their distributional restriction to Lake Ontario coastal environments within the TRCA jurisdiction and their dependence on dynamic coastal processes (wind and water action). This probably includes even the artificial Rubble Open Shoreline / Beach (BBO2-A) because, as it was designed, it is starting to collect sand and gravel and even some shoreline vegetation. A persistent supply of sand is required to maintain the dynamic sand beach (BBO1-1) and dune (SDS1-A). It appears that the conditions needed for the continuation of the beach and dune habitats have been retained successfully by the park development.

The trail construction has also increased pedestrian access to (and therefore trampling of) the coastal communities. The Mineral Open Bluff (BLO1) can occur along streams as well as coastal environments and is ranked L4. A small area of White Cedar Cultural Woodland (CUW1-A1) is of human origin but ranked L4 because of its affinity for cooler microclimates. There is some cedar regeneration in the vicinity of the GO station.

4.4 Flora Findings for the Port Union Waterfront Park Study Area

4.4.1 Flora Species Representation

A total of 224 naturally-occurring flora species were found at the Port Union Waterfront Park Study Area during the 2007 and 2009 field seasons (Appendix 2). The appendix also includes species records from brief visits in 2002 and 2005 as well as a few that were found in 1997 over a larger area that included the study area. Of the 224 species found in 2007 and 2009, just 88 (39%) are native species. This is due to the history of disturbance and filling, and the lack of established forest and wetland. However, six species are of regional concern (L1 to L3). Two L2 species and four L3 species were found. There were also 20 species ranked L4 and hence of concern in urban areas. Three species of regional concern and five of urban concern were introduced to the site through restoration plantings; examples included black choke-berry (*Aronia melanocarpa*), big bluestem (*Andropogon gerardii*), and white spruce (*Picea glauca*).

4.4.2 Flora Species of Concern

As with vegetation communities, flora species are considered of regional concern in the TRCA jurisdiction if they rank L1 to L3 based on their scores for four criteria: local occurrence; population trend; habitat dependence; and sensitivity to development impacts. Most of the flora species of concern are not rare plants *per se*, since few of them rank as provincially rare (S1-S3); however, they are of conservation concern due to their sensitivity to development and restriction to certain habitats or certain areas within the TRCA region. The flora species of concern are generally associated with specific vegetation communities; consequently, they are highly susceptible to changes in these communities. They score relatively high in *habitat dependence* (Appendix 2). Roughly, they are found in fewer than seven ecosites or habitat types according to the ELC (TRCA, 2010).

All of the regional species of concern observed in 2007 and 2009 are clustered in the coastal habitats near the mouth of Highland Creek although a few previously-observed ones occur elsewhere (Map 10). The sea rocket (*Cakile edentula*), seaside spurge (*Chamaesyce polygonifolia*), and bushy cinquefoil (*Potentilla paradoxa*) occur on the beach, while the Canada wild rye (*Elymus canadensis*), Oake's evening-primrose (*Oenothera oakesiana*), and germander (*Teucrium canadense*) are found on the dune (formerly grading into a coastal meadow-marsh). It is worth noting that one or two plants of sea rocket and germander had colonized the newer Rubble Open Shoreline / Beach from the Highland Creek beach to the west.

The L4 species found throughout the site tend to be less habitat-dependent and may be associated with successional habitats. Noteworthy species include two kinds of serviceberry (*Amelanchier sanguinea* appearing on the dune and *A*. x *interior* in the successional habitat), two hawthorns (*Crataegus holmesiana* and *C. macracantha*), American bittersweet (*Celastrus scandens*), smooth wild rose (*Rosa blanda*), and pin cherry (*Prunus pensylvanica*). In 2009, retrorse sedge (*Carex retrorsa*) and peach-leaved willow (*Salix amygdaloides*) were recorded at the site.

Most of the flora species of concern (all of the L1 to L3) at this site would be negatively affected by specific *sensitivity to development* impacts, scoring three or more for this criterion (Appendix 2; Map 11). These impacts are indirect ones emanating from the surrounding land use or *matrix influence*. Areas that have a history of land use disturbance, including agriculture, have fewer sensitive species. Such a history is certainly characteristic of Port Union, from past shoreline residential uses to recent urban intensification and park construction with new access to the public provided.

Hydrological changes from nearby development (e.g. the park and its infrastructure) can include changes in drainage and increased storm-water. The coastal meadow marsh community (MAM4-A) has become a drier one, while Highland Creek's extreme urban flooding results in episodes of erosion. Although most of the coastal species still survive in the current dune community, some have declined or disappeared.

Disturbance caused by development and increased recreational use also facilitates the spread of invasive species. Dog-strangling vine is the most severe invasive species on site, and a major problem across much of the eastern part of the TRCA jurisdiction. It is the dominant ground layer species in the three vegetation community polygons forming the railway embankment west of the pedestrian access. This species, which originated in eastern Ukraine and southern Russia, has spread rapidly in the Toronto area over recent decades. It can out-compete most native plants and inhibit forest regeneration. The presence of dog-strangling vine makes the future of the smooth wild rose (*Rosa blanda*) and American bittersweet (*Celastrus scandens*) species somewhat uncertain, along with other native species in these communities. It is also very likely to invade the new meadow areas on the filled parkland at the base of the railway embankment.

Other invasives such as garlic mustard (*Alliaria petiolata*), lily-of-the-valley (*Convallaria majalis*), and Norway maple (*Acer platanoides*) are prominent in the formerly-residential scrub areas east of the pedestrian access tunnel. Japanese knotweed (*Polygonum cuspidatum*) occurs sporadically at the west end of the railway embankment. These species can be expected to spread rapidly with trails and use and disturbance caused maintenance or construction equipment. They would likely inhibit the future succession of these habitats to native communities and contribute to the failure of restoration plantings. Many native plants, especially when subjected to other stresses, cannot compete with invasives. For example, native tree saplings are smaller and slower-growing than a number of invasive alien species even though they themselves may be common species. Increased populations of deer are present in the nearby Rouge valley and other areas with light to moderate amounts of development. The deer overbrowse many native species, including native tree saplings such as white cedar (*Thuja occidentalis*) (L4).

Alteration of coastal dynamic regimes can lead to the extirpation of species that require coastal environments. All the L1 to L3 species such as sea rocket and seaside spurge are found within communities dependent upon natural wind and water action, erosion and deposition. If the shoreline is hardened or eroded away, such species will disappear. Fortunately, the park was designed to maintain such coastal processes through its headland-and-embayment design and the initial impression is one of success. As for the L4 species of more generalized successional communities, they depend on a certain pattern of disturbance to maintain an open habitat. Long-term succession with canopy closure may make conditions less favourable for the hawthorn species and smooth wild rose, for example.

Increased access and use associated with an urban matrix also involves increased trampling and soil compaction. Port Union is much more accessible to a greater number of people than formerly. While the beach and dune species are physiologically tough, their habitats tend to attract a lot of pedestrian traffic and so they must be considered vulnerable to intensive levels of trampling.

In response to loss of habitat and stresses from land use changes, susceptible flora exhibits a declining *population trend* and may become rare or even extirpated. Because of urbanization, most native flora species in the Toronto area are suspected to be undergoing slight declines as the total land base becomes smaller. Species that are considered rare according to the *local occurrence* criterion are found in fewer than 7 of the forty-four 10x10 km grid squares that cover

the TRCA jurisdiction. Most of the rare or uncommon species (seven of the L1 to L4 species) found at Port Union have a naturally limited distribution (i.e. coastal) in addition to whatever other sensitivity factors they may have. And indeed a few species seemed to have disappeared from the Port Union Waterfront Park Study Area in recent years.

4.4.3 Floristic Changes since 1997

A number of flora species found within the boundaries of the site in 1997, 2002 and/or 2005 were not recorded in either 2007 or 2009 (Appendix 2a). Big bluestem (*Andropogon gerardii*) for example, occurred along the railway tracks in 1997, but the exact location was not visible through the fence erected along the railway so its presence or absence could not be verified. In 2009, big bluestem (ranked L3) was re-introduced to the site as a planting.

Three species that occurred in or along the edge of the Fresh-Moist Poplar Deciduous Forest (FOD8-1) at the base of the railway slope had been observed in the past but were likely eliminated by the construction of the Waterfront Trail. These were pinesap (*Monotropa hypopithys*) and two grasses: eared brome (*Bromus latiglumis*) and Canada bluejoint (*Calamagrostis canadensis*). They were in the lower area of the woodland that had been cut to make way for the trail. Pinesap is usually in younger coniferous forests, especially white pine plantations, but can occur in poplar stands as well. The remaining woodland is now fenced-off so there is a remote possibility that some plants still exist but were not observed in 2007 and 2009. If attempts had been made to transplant these to a new location on site, they probably did not survive as none were observed.

The land disturbance caused by trail construction in conjunction with flooding from a massive storm event on August 19th, 2005 may have contributed to the loss (temporary or permanent) of three species of regional concern: slender gerardia (*Agalinis tenuifolia*), marsh hedge nettle (*Stachys palustris*), and Torrey's rush (*Juncus torreyi*) which had previously been recorded on site. In addition, the populations of bushy cinquefoil (*Potentilla paradoxa*) and woolly sedge (*Carex pellita*) seem to have declined; just four plants of the former and fewer than 20 of the latter were found in 2007. This is probably due to the shrinkage of the same habitat.

On the other hand, germander (*Teucrium canadense*) and boneset (*Eupatorium perfoliatum*) are starting to colonize one of the artificial beach embayments. There is a reasonable chance that at least some of the currently-extirpated species will re-colonize the site from other nearby coastal habitats, particularly if the dynamic beaches continue to remain intact. The main threat now is trampling from heavy public use.

It was unclear from the survey whether dog-strangling vine had caused declines since 1997 in the successional species such as smooth wild rose (*Rosa blanda*), although this is a reasonable inference. The railway margin where many of these species were concentrated is no longer accessible. The new meadow on fill between the Waterfront Trail and the railway embankment must be seen as at risk by invasion from the nearby dog-strangling vine.

4.5 Fauna Species Findings for the Port Union Waterfront Park Study Area

4.5.1 Fauna Species Representation

The TRCA fauna surveys at the Port Union Waterfront Park Study Area in 2007 and 2009 documented a total of 32 bird species. One herpetofauna species (*Rana pipiens*) was reported in 2002, bringing the total number of breeding fauna species recorded by TRCA fauna surveys in the past decade to 33. In late August, 2007, there was a report of a mink (*Mustela vison*) feeding along the foreshore of the study area; this sighting has been included in this inventory, and therefore the total number of fauna species is 34. Refer to Appendix 3 for a list of the fauna species and their corresponding L-ranks.

4.5.2 Fauna Species of Concern

Fauna species, like vegetation communities and flora species, are considered of regional concern if they rank L1 to L3 based on their scores for the seven criteria mentioned in Section 3.0. Since the subject site is situated within the urban zone this report also considers those species ranked as L4, i.e. those species that are of concern in urban landscapes.

As with flora, this is a proactive, preventive approach, identifying where conservation efforts need to be made before a species becomes rare. Fauna surveys at the Port Union Waterfront Park Study Area reported 10 bird species of regional and urban concern (L1 to L4), including one L3 bird species: yellow-billed cuckoo (*Coccyzus americanus*). In addition, there was one herpetofauna of regional and urban concern (northern leopard frog, ranked L3) and one mammal species of urban concern (mink, ranked L4), bringing the total to 12 fauna species of regional and urban concern. Locations of these breeding fauna are depicted on Map 12.

Local occurrence is one of seven scoring criteria for fauna species and is based on TRCA data and information from the Natural Heritage Information Centre (NHIC) of the Ontario Ministry of Natural Resources (OMNR) (NHIC 2008). Using local occurrence as a measure of regional rarity, any species that is reported as a probable or confirmed breeder in fewer than 10 of the forty-four 10x10 km UTM grid squares in the TRCA jurisdiction is considered regionally rare (i.e. scores three to five points for this criterion) (TRCA, 2010). None of the fauna species reported from the Port Union Waterfront Park Study Area are considered regionally rare although both the L3 ranked yellow-billed cuckoo (*Coccyzus americanus*) and L5 ranked orchard oriole (*Icterus spurius*) score highest with two points in this criterion, indicating that TRCA surveys have found breeding evidence of these species in just between 11 and 15 of the 44 grid squares across the region. Orchard oriole is a fairly recent colonist in the region; this typically suburban-tolerant species, spreading from the south and west, has its stronghold in the region along the lakeshore and so it is not surprising that the species is at Port Union. The presence of yellow-billed cuckoo, reported from the study area in 2007, is considerably more surprising but given that cuckoos can still be migrating as late as the 15th of June it is possible that this 18th of June record refers to a very late migrant. Certainly, the habitat at Port Union is marginal for this area sensitive species. As is the

case with flora, most regionally rare fauna species have other associated factors that explain their vulnerability and need to be taken into account in conservation strategies.

Sensitivity to development is another criterion used to determine the L-rank of fauna species. A large number of impacts that result from local land use, both urban and agricultural, can affect the local fauna. These impacts – considered separately from the issue of actual habitat loss – can be divided into two distinct categories. The first category involves changes that arise from local urbanization that directly affect the breeding habitat of the species in question. These changes alter the composition and structure of the vegetation communities; for example, the clearing and manicuring of the habitat (e.g. by removal of dead wood and clearance of shrub understorey). The second category of impacts involves changes that directly affect individuals of the species in question. Examples include increased predation from an increase in the local population of predator species that thrive alongside human developments (e.g. blue jays, *Cyanocitta cristata;* American crows, *Corvus brachyrhynchos;* squirrels, raccoons and house cats); parasitism (from facilitating the access of brown-headed cowbirds, *Molothrus ater*, a species which prefers more open, edge-type habitat); competition (for nest-cavities with bird species such as house sparrows, *Passer domesticus*; and European starlings, *Sturnus vulgaris*); flushing (causing disturbance and abandonment of nest) and, sensitivity to pesticides.

Fauna species are considered to have a high sensitivity to development if they score three or more points (out of a possible five) for this criterion. At the Port Union Waterfront Park Study Area, nine of the species that are ranked L1 to L4 receive this score and are therefore considered sensitive to one or more of the impacts associated with development (Map 7). Two of these species (yellow-billed cuckoo and northern leopard frog) are ranked L3. As previously mentioned, the record of yellow-billed cuckoo can probably be discounted, but the report of leopard frog, although referring to a late summer foraging individual, is potentially quite significant. The nearest records that TRCA has for this species are in the mouth of the Rouge, 3 km to the east of the Port Union observation. There have been no leopard frogs reported from the mouth of the Highland Creek, but it is possible that the individual reported from Port Union in 2002 was a wanderer from this neighbouring wetland. In 2007 there was some standing water in the lower lying land between the trail and the railway, these small depressions appear to have been filled in subsequent years. There may be the potential to recreate and enhance these tiny wetlands in the hopes of establishing a population of this declining species, however, the visitor pressure may be such that even if appropriate habitat is provided the matrix influence (from people and dogs) will preclude the establishment of a viable population on site.

Matrix influence score at the Port Union Waterfront Park Study Area is shown as “good” but it is important to understand that the TRCA habitat patch scoring protocol counts Lake Ontario as “natural habitat” and therefore much of the area surrounding the Port Union site is weighted positively for matrix influence, when in reality the proximity of the waters of Lake Ontario have no positive effect on the Port Union site from a matrix influence perspective – for example, the lake does not present any species recruitment opportunities. It is also important to understand that negative matrix influences are not solely associated with the proximity of urban and suburban developments; many of the negative influences can be transferred deep within an otherwise intact

natural matrix by extensive trail networks used by large numbers of people originating from quite distant urban and suburban centres. Extensive public use of a natural habitat can have substantial negative impact through the cumulative effects of hiking, dog-walking and biking on the site.

The tendency for local urbanization to be accompanied by the clearing and maintenance of woodlands and thickets in the vicinity dramatically disrupts any species that is dependent on such scrub cover for nesting or foraging, and two of the sensitive bird species at Port Union Waterfront Park Study Area have such specific requirements (grey catbird, *Dumetella carolinensis*, and indigo bunting, *Passerina cyanea* – species that are dependent on thick, tangled forest understorey).

Spotted sandpiper (*Actitis macularius*), found in the study area, nests low on the ground and as such is highly susceptible both to increased predation from ground-foraging predators that are subsidized by local residences (house cats, raccoons) and to repeated flushing from the nest (by pedestrians, off-trail bikers and dogs) resulting in abandonment and failed breeding attempts. These same disturbances also have considerable impact on northern leopard frogs in their summer-foraging habitat.

Various studies have shown that many bird species react negatively to human intrusion (i.e. the mere presence of people) to the extent that nest-abandonment and decreased nest-attentiveness lead to reduced reproduction and survival. One example of such a study showed that abundance was 48% lower for hermit thrushes (a ground-nesting/foraging species) in intruded sites than in the control sites (Gutzwiller and Anderson 1999). Elsewhere, a recent study reported that dog-walking in natural habitats caused a 35% reduction in bird diversity and a 41% reduction in abundance, with even higher impacts on ground-nesting species (Banks and Bryant 2007).

Area sensitivity is a scoring criterion that can be closely related to the issue of a species' need for isolation. Fauna species are scored for area sensitivity based on their requirement for a certain minimum size of preferred habitat. Species that require large tracts of habitat (>100 hectares in total) score the maximum five points, while species that either show no minimum habitat requirement, or require <1 hectare in total, score one point. Species scoring three points or more (require ≥5 hectares in total) are deemed area sensitive species. Researchers have shown that for some species of birds, area sensitivity is a rather fluid factor, dependent and varying inversely with the overall percentage forest cover within the landscape surrounding the site where those species are found (Rosenburg *et al.* 1999). Three of the fauna species of regional and urban concern that were identified are considered area sensitive.

Species' patch-size constraints are due to a variety of factors including foraging requirements and the need for isolation within a habitat block during nesting. In the latter case, regardless of the provision of a habitat patch of sufficient size, if that block is seriously and frequently disturbed by human intrusion, such species will be liable to abandon the site. A variety of habitat needs are more likely satisfied within a larger extent of natural cover, which also provides opportunities for sensitive species to retreat to undisturbed portions of the same block.

Mink (*Mustella vison*) is an area sensitive species that has shown considerable adaptation to the urban landscape in recent years, to the extent that the species is now found along many urban waterways. It is no surprise, then, to find mink on the lakeshore at Port Union since the shoreline here is continuous with beaches to the east and to the west, and furthermore is adjacent to the natural habitat associated with the mouth of the Highland Creek.

Blue-grey gnatcatcher (*Polioptila caerulea*), another recent colonist from south of the region, scores high for area sensitivity, requiring in excess of 5 hectares of forest cover. This requirement is not satisfied by habitat on site, however, this is a species that nests at upper canopy level and as such is able to nest in urban landscapes where sufficiently extensive canopy is provided by street and garden trees. This appears to be the case at Port Union where tree cover along the top of the bluffs is almost continuous with extensive urban tree canopy (more than 4 hectares shown in the 2007 jurisdictional habitat maps) along Ridgewood Road just 500 metres to the east of the site.

Patch isolation sensitivity in fauna measures the overall response of fauna species to fragmentation and isolation of habitat patches. One of the two main aspects of this scoring criterion is the physical ability or the predisposition of a species to move about within the landscape and is related to the connectivity of habitat within a landscape. The second main aspect is the potential impact that roads have on fauna species that are known to be mobile. Thus most bird species score fairly low for this criterion (although they prefer to forage and move along connecting corridors) whereas many herpetofauna score very high (since their life cycle requires them to move between different habitat types which may increase likelihood of roadkill). One example of how this criterion affects species populations is the need for adult birds to forage for food during the nestling and fledgling stage of the breeding season. By maintaining and improving the connectivity of natural cover within the landscape (e.g. by reforestation of intervening lands) we are able to positively influence the populations of such species, improving their foraging and dispersal potential.

Of the two fauna species that score high for the patch isolation sensitivity criterion (mink and northern leopard frog), northern leopard frog is both the more significant and the more sensitive. This species habitually wanders considerable distances from breeding ponds and individuals are highly susceptible to road-kill and other impacts as they move across the landscape.

Species such as leopard frog have effectively been extirpated from much of the natural cover within the urbanized portions of the jurisdiction, although they are still thriving at many lakeshore sites and in the vicinity of river mouth wetlands. As long as such lakeshore populations are able to withstand the ever increasing recreational pressures of local residents and visitors alike, these populations may provide sources for recruitment for re-establishing populations further inland and up-river. There should be additional surveys conducted specifically for this species so as to ascertain the condition of the local northern leopard frog population.

Fauna species that score greater than three points under the *habitat dependence* criterion are considered habitat specialists (Map 12). These species exhibit a combination of very specific

habitat requirements that range from their microhabitat (e.g. decaying logs, aquatic vegetation) and requirements for particular moisture conditions, vegetation structure or spatial landscape structures, to preferences for certain community series and macro-habitat types. Three fauna species that occur in the study area are considered habitat specialists, and only one of these species – yellow-billed cuckoo - has a preference for treed habitat. The remaining two habitat dependent species – bank swallow (*Riparia* riparia) and northern rough-winged swallow (*Stelgidopteryx serripennis*) – are both highly dependent on very specific micro-habitat conditions, bank swallow requiring bluffs or cliffs of the appropriate sandy substrate in which to excavate nest-cavities, while northern rough-winged swallow tends to use existing cavities.

Representation is essentially the presence or absence of a species at a site. However, beyond mere representation of single species is the idea that a natural system can be considered as a healthy functioning system if there is an association of several species thriving within that system. Each habitat type supports particular species associations. As the quality of the habitat patch improves so will the representation of flora and fauna species within that habitat. In this way representation biodiversity is an excellent measure of the health of a natural system. The presence of so few habitat dependent species indicates that the habitats at the Port Union Waterfront Park Study Area are not functioning at a particularly high level from the fauna perspective.

4.5.3. Migrating Birds on the Lakeshore

Given the paucity of breeding habitat (both forest and scrub habitat) and the level of human disturbance associated with this site it is highly unlikely whether any but the most resilient of fauna species will find suitable breeding opportunities on the site. Nevertheless, Port Union Waterfront Park Study Area, as a relatively undeveloped lakeshore property, is of high significance for any migrating or dispersing fauna species, particularly those species that do not spend any time foraging at ground level. Maintenance of a healthy canopy of mature trees and shrubs will facilitate the movements of any species that utilize the tree canopy to move through an area. This is particularly important on the lakeshore where thousands of first-time migrants gather in the fall, searching for easy passage to the south. Many of these migrants coast along the lakeshore, feeding as they go, in search of a narrow lake crossing, or replenishing fat deposits that will sustain them in a flight across the Great Lakes. The same is true of migrating insects such as the monarch butterfly and even migrant bats that no doubt pass along this shoreline.

5.0 Recommendations

The recommendations for the Port Union Waterfront Park Study Area are given in relation to the regional targets for natural heritage in the TRCA jurisdiction. To reach the regional targets for quality distribution and quantity of natural cover, every site will require its own individualized plan of action. Following is a short summary of the site within the regional context, followed by specific recommendations.

5.1 Site Highlights

- Small restored beach complex near the mouth of Highland Creek
- Bluffs along Lake Ontario physiographic features of interest
- 13 vegetation types observed, which reflects the natural and anthropogenic communities at the site
- 244 flora species observed in 2007 and 2009; flora are concentrated in forest and coastal communities
- Total of 34 vertebrate fauna species observed
- Northern leopard frog was observed in suitable summer-foraging habitat in September, 2002
- A small bank swallow colony of approximately ten nests is located on the coastal bluff
- 4.73 hectares of natural cover present (37% of the Port Union Waterfront Park Study Area is natural cover)
- Areas of natural habitat on the shoreline of Lake Ontario, particularly situated at the mouths of rivers and creeks, are important staging areas for migrating songbirds.

5.2 Site Recommendations

Minimize Negative Matrix Influence

Although landscape metrics indicate that the matrix influence at the site is largely positive, this does not take into account the high level of disturbance that occurs throughout the summer months due to the large number of visitors to the site for recreational activities. This visitor pressure is unlikely to improve in the future. Any future plantings with a view to improving the natural heritage at the site needs to consider the locations of most intense visitor pressure and to direct restoration efforts to areas within the study area that are not generally accessed by the public.

- Visitors need to be directed away from sensitive species. Signage educating the public about the sensitivities of dynamic coastal communities and the many flora species that they harbour. Trampling is a concern to the re-colonization of sensitive flora species.

- Invasive species populations such as Dog-strangling vine, garlic mustard field thistle and crown vetch should be controlled in order to support the native biodiversity and to ensure the continued success of restoration plantings within the area.

- Controlling sources of disturbance such as erosion (in forest environments), nutrient input, and trampling as well as screening plantings may be a factor in containing exotic invasions.

Improve Connectivity to Nearby Habitat

Continuity of natural habitat along the Lake Ontario lakeshore is of considerable importance to migrating and dispersing fauna species within the region. The imposition of even small areas of hostile environment within an otherwise continuous corridor of natural habitat can undermine the positive opportunities provided by a high level of connectivity, particularly for non-avian fauna.

Improve Habitat Quality

Habitat degradation from factors such as changes in hydrology, increased erosion and the introduction of invasive species have lead to the decline and disappearance of various flora species in recent years. Minimizing developmental impacts such as these is imperative to improving habitat quality and preventing further biodiversity loss.

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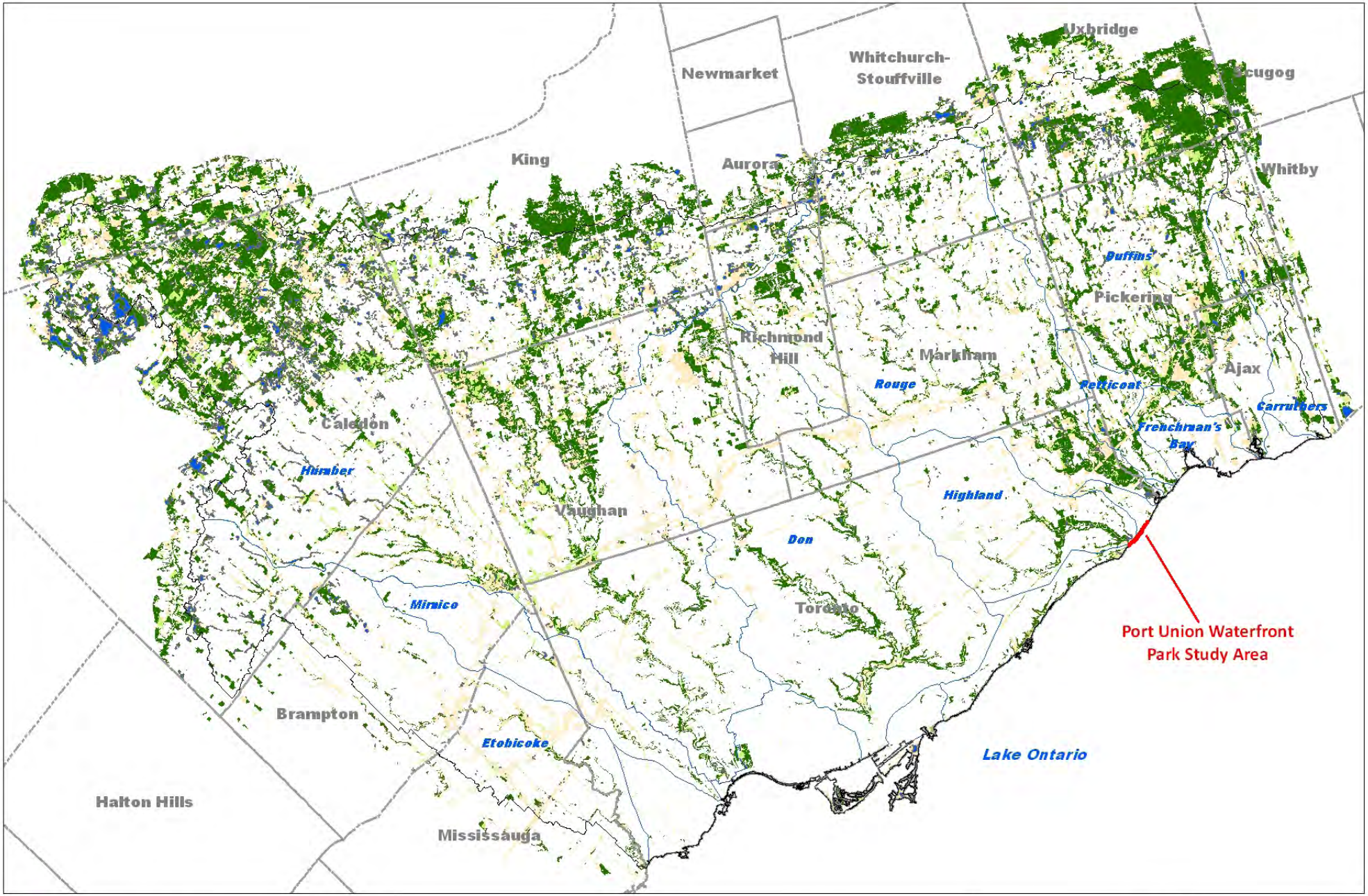


TORONTO AND REGION Conservation for The Living City

N

0 2.5 5 10 15 20 Kilometers

Date: December 2010

* Landscape analysis based on 2007/2008 Orthophotography

Map 1:
Port Union Waterfront Park Study Area in the Context of Regional Natural Cover

Natural Cover *
- Forest
- Successional
- Meadow
- Wetland
- Beach/Bluff

Legend
- Port Union Waterfront Park Study Area
- TRCA Jurisdiction
- Watershed
- Municipal Boundary

TORONTO AND REGION Conservation for The Living City

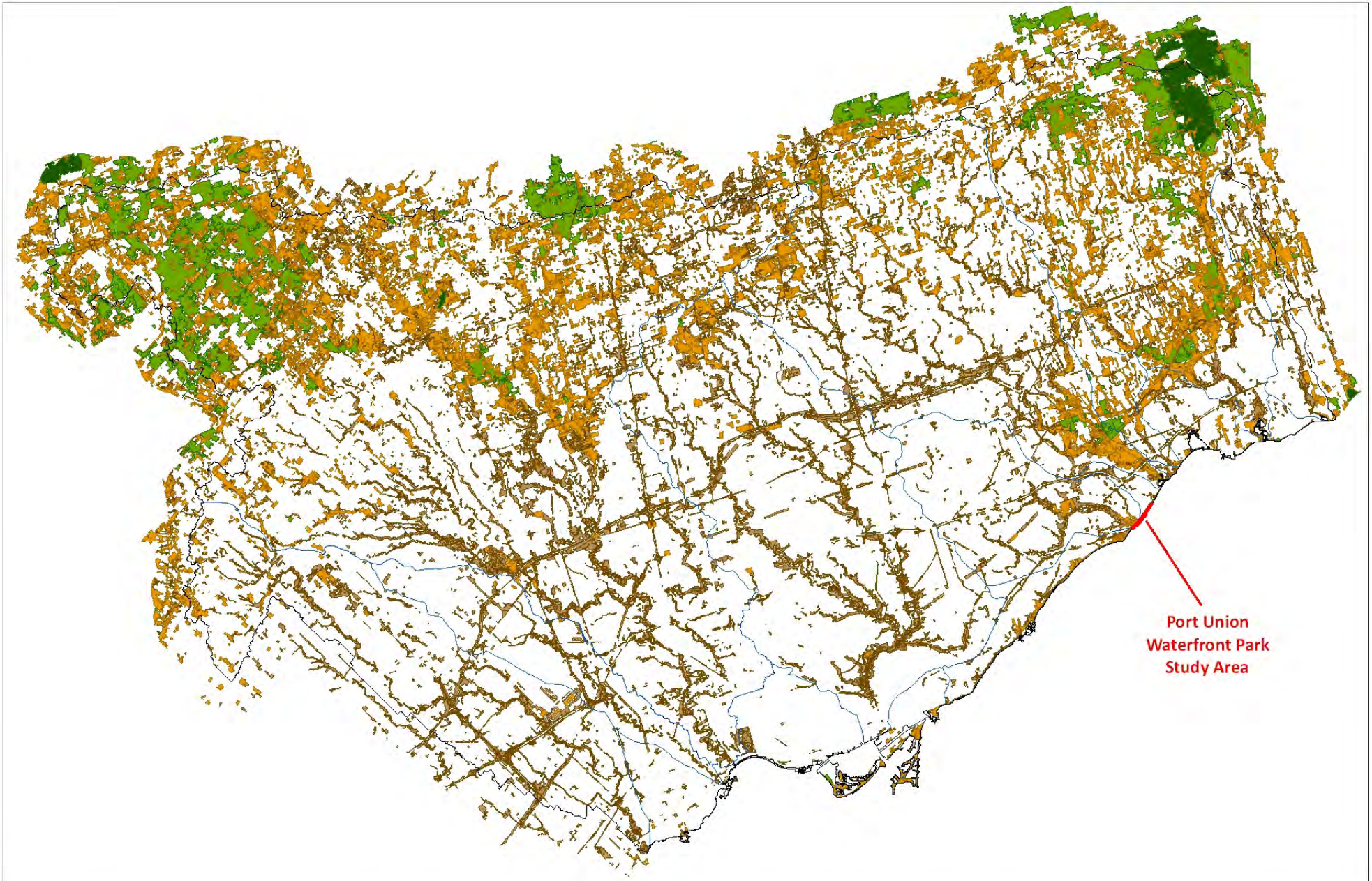
0 50 100 200 300 400 Meters

Date: December 2010
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 2:
Port Union Waterfront Park
Study Area

Legend

Study Area



TORONTO AND REGION Conservation for The Living City

N

0 2.5 5 10 15 20 Kilometers

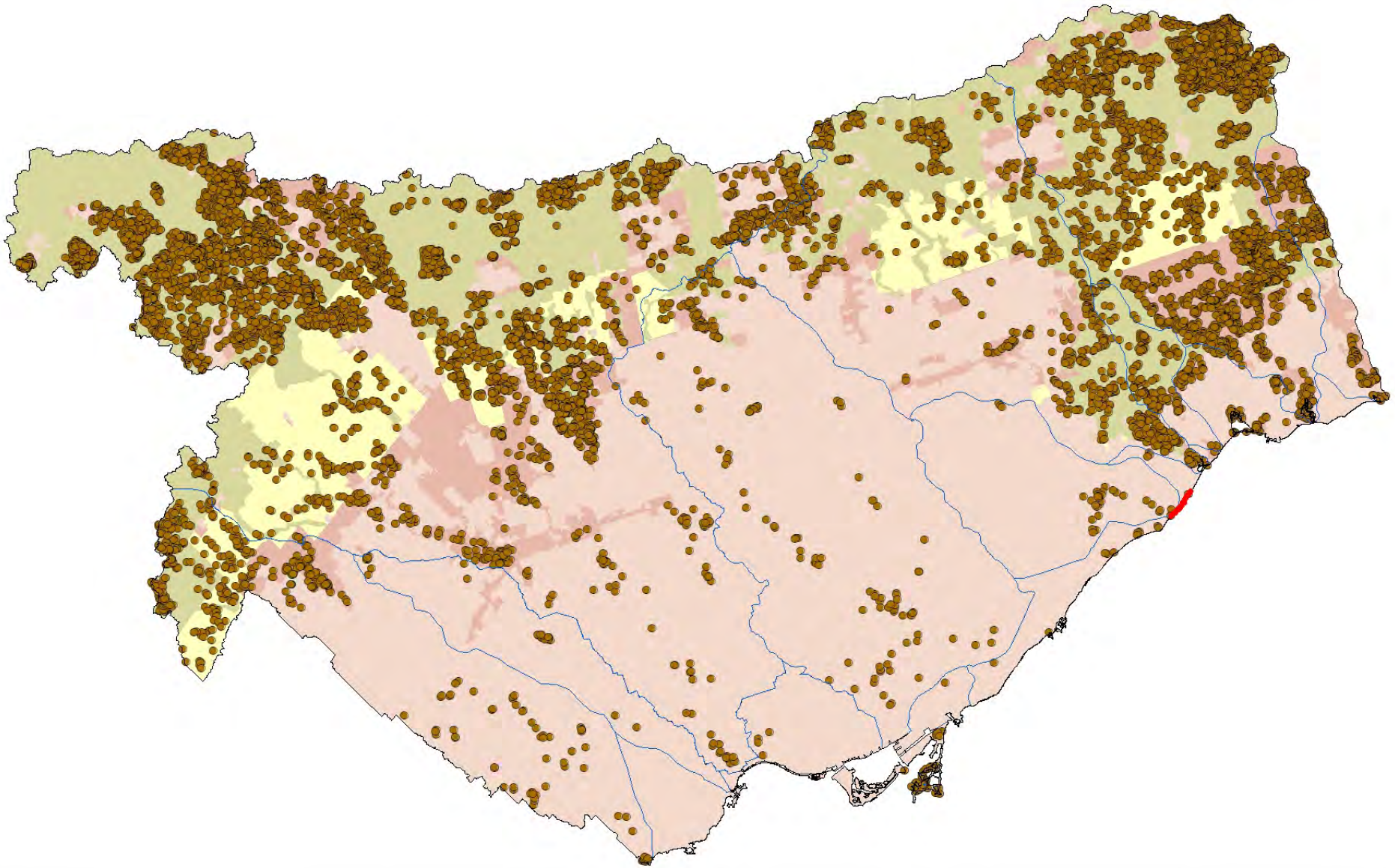
Date: December 2010
* Landscape analysis based on 20072008 Orthophotography

Map 3:
Regional Natural System
Habitat Patch Quality

Legend

Habitat Patch Quality *
- L1 - Excellent
- L2 - Good
- L3 - Fair
- L4 - Poor
- L5 - Very Poor

- Port Union Waterfront Park Study Area
- TRCA Jurisdiction
- Watershed



TORONTO AND REGION Conservation for The Living City

0 2.5 5 10 15 20 Kilometers

Date: December 2010

Map 4:
Distribution of Fauna
Regional Species of Concern

Legend

- Fauna Species of Concern (L1 - L3)
- Port Union Waterfront Park Study Area
- TRCA Jurisdiction
- Watershed
- Agricultural & Rural Area
- Built-up Area
- Designated Greenfield Area
- Greenbelt Area

Fauna Area Sensitivity Scores

- 5 - >100ha
- 4 - >20ha
- 3 - > 5ha
- 2 - > 1ha
- 1 - < 1ha

- Fauna Species
- Frog Species

Habitat Patch Size Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor

TORONTO AND REGION Conservation for The Living City

N

0 50 100 200 300 400 Meters

Date: December 2010
Orthophoto: Spring 2007, First Base Solutions Inc.
* Landscape analysis based on 20072008 Orthophotography

Map 5: Habitat Patch Size Scores with Fauna Area Sensitivity Scores

Legend

Port Union Waterfront Park Study Area

NOTE: All fauna species with their associated scores for area sensitivity can be found in Appendix #3.

Flora Sensitivity to Development Scores

- 5 - Species receives severe negative impact from development-related disturbances
- 4 - Species receives moderately severe negative impact from development-related disturbances
- 3 - Species receives significant negative impact from development-related disturbances
- 2 - Species receives slight negative impact from development-related disturbances
- 1 - Species experiences no overall benefit or detriment from development-related disturbances (neutral)
- 0 - Species benefits significantly from development-related disturbances

NOTE: All flora species with their associated scores for sensitivity to development can be found in Appendix #2.

- Flora Species
- Planted Flora Species

TORONTO AND REGION Conservation for The Living City

N

0 50 100 200 300 400 Meters

Date: December 2010
Orthophoto: Spring 2007, First Base Solutions Inc.
* Landscape analysis based on 2007/2008 Orthophotography

Map 6: Scores for Matrix Influence and Flora Sensitivity to Development

Legend

Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor

Port Union Waterfront Park Study Area

Fauna Sensitivity to Development Scores

- 5 - Species receives severe negative impact from development-related disturbances
- 4 - Species receives moderately severe negative impact from development-related disturbances
- 3 - Species receives significant negative impact from development-related disturbances
- 2 - Species receives slight negative impact from development-related disturbances
- 1 - Species experiences no overall benefit or detriment from development-related disturbances (neutral)
- 0 - Species benefits significantly from development-related disturbances

NOTE: All fauna species with their associated scores for sensitivity to development can be found in Appendix #3.

△ Fauna Species

□ Frog Species

TORONTO AND REGION Conservation for The Living City

N

0 50 100 200 300 400 Meters

Date: December 2010
Orthophoto: Spring 2007, First Base Solutions Inc.
* Landscape analysis based on 2007-2008 Orthophotography

Map 7: Scores for Matrix Influence and Fauna Sensitivity to Development

Legend

Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor

Port Union Waterfront Park Study Area

TORONTO AND REGION Conservation for The Living City

N

0 50 100 200 300 400 Meters

Date: December 2010
Orthophoto: Spring 2007, First Base Solutions Inc.
* Landscape analysis based on 2007/2008 Orthophotography

Map 8: Habitat Patch Quality

Legend

Habitat Patch Quality *

- L1 - Excellent
- L2 - Good
- L3 - Fair
- L4 - Poor
- L5 - Very Poor

Port Union Waterfront Park Study Area

TORONTO AND REGION Conservation for The Living City

N

0 50 100 200 300 400 Meters

Date: December 2010
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 9: Vegetation Communities with their Associated Local Ranks

Legend

Vegetation Community Ranks

- L1
- L2
- L3
- L4
- L5
- L+

Port Union Waterfront Park Study Area

TORONTO AND REGION Conservation for The Living City

N

0 50 100 200 300 400 Meters

Date: December 2010
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 10: Location of Flora Species of Concern

Legend

Flora Species of Concern (L1-L4)
- L1
- L2
- L3
- L4

Planted Flora Species of Concern (L1-L4)
- L1
- L2
- L3
- L4

Port Union Waterfront Park Study Area

Flora Habitat Dependence Scores

- 5 - Extreme habitat specialist
- 4 - Strong habitat specialist
- 3 - Moderate habitat specialist
- 2 - Moderate habitat generalist
- 1 - Strong habitat generalist
- 0 - Extreme habitat generalist

- Flora Species
- Planted Flora Species

NOTE: All flora species with their associated scores for habitat dependence can be found in Appendix #2.

TORONTO AND REGION Conservation for The Living City

N

0 50 100 200 300 400 Meters

Date: December 2010
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 11: Flora Habitat Dependence Scores

Legend

Port Union Waterfront Park Study Area

TORONTO AND REGION Conservation for The Living City

N

0 50 100 200 300 400 Meters

Date: December 2010
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 12: Location of Fauna Species of Concern

Legend

Fauna Species of Concern: L1, L2, L3, L4

Frog Species of Concern: L1, L2, L3, L4

Port Union Waterfront Park Study Area

Appendix 1: List of TRCA Vegetation Communities found in the Port Union Study Area in 2007 and 2009						
ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores Local Occur.	Geophy. Requir.	Total Score	Local Rank (2010-04)
	Forest					
FOD4-e	Dry-Fresh Exotic Deciduous Forest	0.37	2.5	0.0	2.5	L+
FOD8-1	Fresh-Moist Poplar Deciduous Forest	0.33	1.0	0.0	1.0	L5
	Successional					
CUT1-1	Sumac Cultural Thicket	0.36	1	0	1	L5
CUS1-A1	Native Deciduous Successional Savannah	1.01	1.5	0.0	1.5	L5
CUW1-A1	White Cedar Successional Woodland	0.17	2.5	1.0	3.5	L4
CUW1-A3	Native Deciduous Successional Woodland	1.07	1.5	0.0	1.5	L5
CUW1-b	Exotic Successional Woodland	0.41	1.5	0.0	1.5	L+
	Dynamic (Beach, Bluff, Barren, Prairie, Savannah)					
BBO1	Mineral Open Beach	0.34	3.0	2.0	5.0	L3
BLO1	Mineral Open Bluff	0.15	2.5	2.0	4.5	L4
BBO1-1	Sea Rocket Open Sand Beach	0.75	3.5	3.0	6.5	L2
BBO2-A	Rubble Open Shoreline	1.65	3.5	0.0	3.5	L5
SDS1-A	Willow Shrub Sand Dune	0.24	4.0	2.0	6.0	L3
	Meadow					
CUM1-b	Exotic Cool-season Grass Graminoid Meadow	2.04	1.0	0.0	1.0	L+

Appendix 2: List of Flora Species found in the Port Union Study Area in 2007 and 2009		
		Rank TRCA
Scientific Name	**Common Name**	**(03/2009)**
Cakile edentula	sea-rocket	L2
Chamaesyce polygonifolia	seaside spurge	L2
Celastrus scandens	American bittersweet	L3
Oenothera oakesiana	Oake's evening-primrose	L3
Potentilla paradoxa	bushy cinquefoil	L3
Teucrium canadense ssp. *canadense*	wood-sage	L3
Acer saccharinum	silver maple	L4
Amelanchier sanguinea var. *sanguinea*	round-leaved serviceberry	L4
Amelanchier x *interior*	hybrid serviceberry complex	L4
Betula papyrifera	paper birch	L4
Carex pellita	woolly sedge	L4
Carex retrorsa	retrorse sedge	L4
Crataegus holmesiana	Holmes' hawthorn	L4
Crataegus macracantha	long-spined hawthorn	L4
Elymus canadensis	Canada wild rye	L4
Eupatorium perfoliatum	boneset	L4
Galium aparine	cleavers	L4
Monarda fistulosa	wild bergamot	L4
Prunus pensylvanica	pin cherry	L4
Quercus macrocarpa	bur oak	L4
Rosa blanda	smooth wild rose	L4
Rudbeckia hirta	black-eyed Susan	L4
Salix amygdaloides	peach-leaved willow	L4
Solidago juncea	early goldenrod	L4
Thuja occidentalis	white cedar	L4
Typha latifolia	broad-leaved cattail	L4
Acer saccharum ssp. *saccharum*	sugar maple	L5
Achillea millefolium ssp. *lanulosum*	woolly yarrow	L5
Ambrosia artemisiifolia	common ragweed	L5
Ambrosia trifida	giant ragweed	L5
Anemone canadensis	Canada anemone	L5
Apocynum cannabinum	hemp dogbane	L5
Asclepias syriaca	common milkweed	L5
Aster cordifolius	heart-leaved aster	L5
Aster ericoides ssp. *ericoides*	heath aster	L5
Aster lanceolatus ssp. *lanceolatus*	panicled aster	L5
Aster novae-angliae	New England aster	L5
Bidens frondosus	common beggar's-ticks	L5
Calystegia sepium	hedge bindweed	L5
Circaea lutetiana ssp. *canadensis*	enchanter's nightshade	L5
Clematis virginiana	virgin's bower	L5
Conyza canadensis	horse-weed	L5
Cornus stolonifera	red osier dogwood	L5
Cryptotaenia canadensis	honewort	L5
Desmodium canadense	showy tick-trefoil	L5

Appendix 2: List of Flora Species found in the Port Union Study Area in 2007 and 2009		
		Rank TRCA
Scientific Name	**Common Name**	**(03/2009)**
Echinocystis lobata	wild cucumber	L5
Epilobium ciliatum ssp. *ciliatum*	sticky willow-herb	L5
Equisetum arvense	field horsetail	L5
Equisetum hyemale ssp. *affine*	scouring-rush	L5
Erigeron annuus	daisy fleabane	L5
Eupatorium maculatum ssp. *maculatum*	spotted Joe-Pye weed	L5
Fraxinus americana	white ash	L5
Fraxinus pennsylvanica var. *pennsylvanica*	red ash	L5
Fraxinus pennsylvanica var. *subintegerrima*	green ash	L5
Geum aleppicum	yellow avens	L5
Impatiens capensis	orange touch-me-not	L5
Juglans nigra	black walnut	L5
Maianthemum stellatum	starry false Solomon's seal	L5
Matteuccia struthiopteris var. *pensylvanica*	ostrich fern	L5
Oenothera biennis	common evening-primrose	L5
Oxalis stricta	common yellow wood-sorrel	L5
Parthenocissus inserta	thicket creeper	L5
Plantago rugelii	red-stemmed plantain	L5
Polygonum lapathifolium var. *lapathifolium*	pale smartweed	L5
Populus balsamifera ssp. *balsamifera*	balsam poplar	L5
Populus deltoides	cottonwood	L5
Populus tremuloides	trembling aspen	L5
Potentilla anserina ssp. *anserina*	silverweed	L5
Prunus virginiana ssp. *virginiana*	choke cherry	L5
Ranunculus sceleratus	cursed crowfoot	L5
Rhus radicans ssp. *rydbergii*	poison ivy (shrub form)	L5
Rhus typhina	staghorn sumach	L5
Ribes americanum	wild black currant	L5
Rubus idaeus ssp. *melanolasius*	wild red raspberry	L5
Rubus odoratus	purple-flowering raspberry	L5
Salix eriocephala	narrow heart-leaved willow	L5
Solanum ptychanthum	American black nightshade	L5
Solidago altissima	tall goldenrod	L5
Solidago canadensis var. *canadensis*	Canada goldenrod	L5
Thalictrum pubescens	tall meadow rue	L5
Tilia americana	basswood	L5
Ulmus americana	white elm	L5
Urtica dioica ssp. *gracilis*	American stinging nettle	L5
Verbena hastata	blue vervain	L5
Verbena urticifolia	white vervain	L5
Vitis riparia	riverbank grape	L5
Xanthium strumarium	clotbur	L5
Fragaria virginiana ssp. *virginiana*	common wild strawberry	LU
Acer negundo	Manitoba maple	L+?
Atriplex prostrata	spreading orache	L+?
Cyperus esculentus	yellow nut-sedge	L+?

Appendix 2: List of Flora Species found in the Port Union Study Area in 2007 and 2009		
		Rank TRCA
Scientific Name	**Common Name**	**(03/2009)**
Lamiaceae species		L+?
Phalaris arundinacea	reed canary grass	L+?
Phragmites australis	common reed	L+?
Abutilon theophrasti	velvet-leaf	L+
Acer platanoides	Norway maple	L+
Aesculus hippocastanum	horse-chestnut	L+
Agrostis gigantea	redtop	L+
Alliaria petiolata	garlic mustard	L+
Alnus glutinosa	European alder	L+
Amaranthus albus	tumbleweed	L+
Amaranthus hybridus	slender pigweed	L+
Amaranthus retroflexus	red-root pigweed	L+
Amorpha fruticosa	shrubby false indigo	L+
Arctium minus ssp. *minus*	common burdock	L+
Artemisia biennis	biennial wormwood	L+
Artemisia vulgaris	common mugwort	L+
Barbarea vulgaris	winter cress	L+
Berberis thunbergi	Japanese barberry	L+
Betula pendula	European white birch	L+
Brassica rapa	turnip	L+
Bromus inermis ssp. *inermis*	smooth brome grass	L+
Bromus tectorum	downy chess	L+
Campanula rapunculoides	creeping bellflower	L+
Capsella bursa-pastoris	shepherd's purse	L+
Carduus nutans ssp. *nutans*	nodding thistle	L+
Carex spicata	spiked sedge	L+
Centaurea maculosa	spotted knapweed	L+
Chelidonium majus	celandine	L+
Chenopodium album var. *album*	lamb's quarters	L+
Chenopodium glaucum	oak-leaved goosefoot	L+
Chrysanthemum leucanthemum	ox-eye daisy	L+
Cichorium intybus	chicory	L+
Cirsium arvense	creeping thistle	L+
Cirsium vulgare	bull thistle	L+
Convallaria majalis	lily-of-the-valley	L+
Coronilla varia	crown vetch	L+
Crepis tectorum	narrow-leaved hawk's beard	L+
Cycloloma atriplicifolia	winged pigweed	L+
Cynanchum rossicum	dog-strangling vine	L+
Cynoglossum officinale	hound's tongue	L+
Dactylis glomerata	orchard grass	L+
Daucus carota	Queen Anne's lace	L+
Descurainia sophia	flixweed	L+
Diplotaxis tenuifolia	slender-leaved wall rocket	L+
Echinochloa crusgalli	barnyard grass	L+
Echium vulgare	viper's bugloss	L+

Appendix 2: List of Flora Species found in the Port Union Study Area in 2007 and 2009		
		Rank TRCA
Scientific Name	**Common Name**	**(03/2009)**
Elymus repens	quack grass	L+
Epilobium hirsutum	European willow-herb	L+
Epilobium parviflorum	small-flowered willow-herb	L+
Erucastrum gallicum	dog mustard	L+
Erysimum cheiranthoides	wormseed mustard	L+
Erysimum hieraciifolium	hawkweed-leaved mustard	L+
Festuca pratensis	meadow fescue	L+
Festuca rubra ssp. *rubra*	red fescue	L+
Forsythia viridissima	forsythia	L+
Geum urbanum	urban avens	L+
Glechoma hederacea	creeping Charlie	L+
Hemerocallis fulva	orange day-lily	L+
Hesperis matronalis	dame's rocket	L+
Hieracium piloselloides	smooth yellow hawkweed	L+
Hordeum jubatum ssp. *jubatum*	squirrel-tail barley	L+
Hypericum perforatum	common St. Johnswort	L+
Impatiens glandulifera	Himalayan balsam	L+
Lactuca serriola	prickly lettuce	L+
Leonurus cardiaca ssp. *cardiaca*	motherwort	L+
Linaria vulgaris	butter-and-eggs	L+
Lolium perenne	perennial rye	L+
Lonicera morrowii	Morrow's honeysuckle	L+
Lonicera x *bella*	shrub honeysuckle	L+
Lonicera xylosteum	European fly honeysuckle	L+
Lotus corniculatus	bird's foot trefoil	L+
Lycopus europaeus	European water-horehound	L+
Lythrum salicaria	purple loosestrife	L+
Malus pumila	apple	L+
Matricaria perforata	scentless chamomile	L+
Medicago lupulina	black medick	L+
Melilotus alba	white sweet clover	L+
Mentha spicata	spear mint	L+
Mirabilis nyctaginea	wild four o'clock	L+
Myosotis scorpioides	true forget-me-not	L+
Nepeta cataria	catnip	L+
Pastinaca sativa	wild parsnip	L+
Phleum pratense	Timothy grass	L+
Plantago lanceolata	English plantain	L+
Plantago major	common plantain	L+
Poa bulbosa	bulblet-bearing blue grass	L+
Poa compressa	flat-stemmed blue grass	L+
Poa nemoralis	woodland spear grass	L+
Poa pratensis ssp. *pratensis*	Kentucky blue grass	L+
Polygonum aviculare	prostrate knotweed	L+
Polygonum convolvulus	black bindweed	L+
Polygonum cuspidatum	Japanese knotweed	L+

Appendix 2: List of Flora Species found in the Port Union Study Area in 2007 and 2009		
		Rank TRCA
Scientific Name	**Common Name**	**(03/2009)**
Polygonum persicaria	lady's thumb	L+
Populus alba	white poplar	L+
Populus x *heimburgeri*	Heimburger's poplar	L+
Portulaca oleracea	purslane	L+
Prunus domestica var. *domestica*	common plum	L+
Puccinellia distans	alkali grass	L+
Ranunculus acris	tall buttercup	L+
Rhamnus cathartica	common buckthorn	L+
Ribes rubrum	garden red currant	L+
Robinia pseudoacacia	black locust	L+
Rosa majalis	cinnamon rose	L+
Rumex crispus	curly dock	L+
Salix alba var. *vitellina*	weeping willow	L+
Salix fragilis	crack willow	L+
Salix x *rubens*	European tree willow	L+
Saponaria officinalis	bouncing Bet	L+
Sedum acre	mossy stonecrop	L+
Senecio viscosus	sticky groundsel	L+
Senecio vulgaris	common groundsel	L+
Silene pratensis	evening lychnis	L+
Sinapis arvensis	charlock	L+
Solanum dulcamara	bittersweet nightshade	L+
Sonchus arvensis ssp. *arvensis*	glandular perennial sow-thistle	L+
Sorbus aucuparia	European mountain-ash	L+
Symphoricarpos albus var. *laevigatus*	western snowberry	L+
Syringa vulgaris	common lilac	L+
Tanacetum vulgare	tansy	L+
Taraxacum officinale	dandelion	L+
Thlaspi arvense	penny-cress	L+
Torilis japonica	hedge-parsley	L+
Tragopogon dubius	lemon-yellow goat's beard	L+
Tragopogon pratensis ssp. *pratensis*	meadow goat's beard	L+
Trifolium aureum	hop-clover	L+
Trifolium hybridum	alsike clover	L+
Trifolium pratense	red clover	L+
Trifolium repens	white clover	L+
Tussilago farfara	coltsfoot	L+
Ulmus pumila	Siberian elm	L+
Verbascum thapsus	common mullein	L+
Viburnum opulus	European highbush cranberry	L+
Vicia cracca	cow vetch	L+
Aronia melanocarpa	black choke-berry	pL2
Andropogon gerardii	big bluestem	pL3
Picea glauca	white spruce	pL3
Amelanchier laevis	smooth serviceberry	pL4
Pinus strobus	white pine	pL4

Appendix 2: List of Flora Species found in the Port Union Study Area in 2007 and 2009		
		Rank TRCA
Scientific Name	**Common Name**	**(03/2009)**
Salix bebbiana	Bebb's willow	pL4
Salix discolor	pussy willow	pL4
Spiraea alba	wild spiraea	pL4
Cornus foemina ssp. *racemosa*	grey dogwood	pL5
Juniperus virginiana	red cedar	pL5
Salix exigua	sandbar willow	pL5
Viburnum lentago	nannyberry	pL5
Rosa virginiana	Virginia rose	pL+?
Celtis occidentalis	hackberry	pL+
Larix decidua	European larch	pL+
Picea abies	Norway spruce	pL+
Rhus aromatica	fragrant sumach	pL+
Salix caprea	goat willow	pL+
Taxus cuspidata	Japanese yew	pL+
Tulipa cultivars	garden tulip	pL+

Appendix 2a: List of flora species found in the Port Union Study Area only in 1997, and/or 2002, and/or 2005

Scientific Name	Common Name	Local Occur. 1-5	Popn. Trend 1-5	Hab. Dep. 0-5	Sens. Dev. 0-5	Total Score 2-20	Rank TRCA (03/2009)
Agalinis tenuifolia	slender gerardia	3	4	5	4	16	L3
Alnus incana ssp. *rugosa*	speckled alder	2	4	4	5	15	L3
Bromus ciliatus	fringed brome grass	2	4	4	5	15	L3
Monotropa hypopithys	pinesap	2	4	5	5	16	L3
Salix lucida	shining willow	2	4	5	3	14	L3
Shepherdia canadensis	russet buffalo-berry	3	4	5	4	16	L3
Sparganium eurycarpum	great bur-reed	2	4	5	4	15	L3
Symphoricarpos albus var. *albus*	eastern snowberry	3	4	4	5	16	L3
Viburnum acerifolium	maple-leaved viburnum	2	3	4	5	14	L3
Acer rubrum	red maple	2	4	1	5	12	L4
Apocynum androsaemifolium	spreading dogbane	2	3	2	4	11	L4
Aster macrophyllus	big-leaved aster	2	3	2	4	11	L4
Bromus latiglumis	eared brome	3	2	4	3	12	L4
Calamagrostis canadensis	Canada blue joint	1	3	4	4	12	L4
Carex deweyana	Dewey's sedge	2	4	3	3	12	L4
Carex pensylvanica	Pennsylvania sedge	2	4	3	4	13	L4
Carex pseudo-cyperus	pseudocyperus sedge	2	3	3	4	12	L4
Carpinus caroliniana ssp. *virginiana*	blue beech	1	3	4	3	11	L4
Cornus rugosa	round-leaved dogwood	2	4	4	3	13	L4
Corylus cornuta	beaked hazel	2	4	3	4	13	L4
Diervilla lonicera	bush honeysuckle	2	3	2	4	11	L4
Fagus grandifolia	American beech	1	4	3	4	12	L4
Geranium maculatum	wild geranium	3	3	4	3	13	L4
Juncus torreyi	Torrey's rush	2	3	4	2	11	L4
Parthenocissus quinquefolia	Virginia creeper	5	1	4	2	12	L4
Populus grandidentata	large-toothed aspen	2	3	4	3	12	L4
Pteridium aquilinum var. *latiusculum*	eastern bracken	2	4	2	4	12	L4
Actaea rubra	red baneberry	2	3	1	3	9	L5
Anemone virginiana	common thimbleweed	2	3	0	3	8	L5
Aralia nudicaulis	wild sarsaparilla	2	3	1	4	10	L5
Aster lateriflorus var. *lateriflorus*	calico aster	2	2	3	2	9	L5
Bidens cernuus	nodding bur-marigold	2	2	3	3	10	L5
Carex bebbii	Bebb's sedge	2	2	3	3	10	L5
Carex blanda	common wood sedge	2	2	1	2	7	L5
Carex rosea	curly-styled sedge	2	2	3	2	9	L5
Carex vulpinoidea	fox sedge	2	2	4	1	9	L5
Clinopodium vulgare	wild basil	3	3	1	3	10	L5
Dryopteris carthusiana	spinulose wood fern	2	3	2	2	9	L5
Elymus virginicus var. *virginicus*	Virginia wild rye	2	2	3	2	9	L5
Erigeron strigosus	rough fleabane	3	2	1	1	7	L5
Eupatorium rugosum	white snakeroot	2	2	2	1	7	L5
Euthamia graminifolia	grass-leaved goldenrod	2	1	4	1	8	L5
Hackelia virginiana	Virginia stickseed	2	2	0	2	6	L5
Juncus dudleyi	Dudley's rush	2	2	3	1	8	L5
Juncus tenuis	path rush	2	2	1	1	6	L5
Maianthemum racemosum ssp. *racemosum*	false Solomon's seal	2	3	2	3	10	L5
Muhlenbergia mexicana var. *mexicana*	common muhly grass	3	2	0	1	6	L5
Onoclea sensibilis	sensitive fern	2	3	1	3	9	L5
Ostrya virginiana	ironwood	2	3	2	2	9	L5
Panicum capillare	panic grass	3	1	4	1	9	L5
Podophyllum peltatum	May-apple	1	3	3	3	10	L5
Prenanthes altissima	tall wood lettuce	2	3	2	2	9	L5
Sambucus canadensis	common elderberry	2	3	2	2	9	L5
Sambucus racemosa ssp. *pubens*	red-berried elder	2	3	2	2	9	L5
Scirpus atrovirens	black-fruited bulrush	2	2	4	2	10	L5
Solidago caesia	blue-stemmed goldenrod	2	2	4	2	10	L5
Solidago flexicaulis	zig-zag goldenrod	2	1	3	2	8	L5
Solidago gigantea	late goldenrod	2	1	1	1	5	L5
Solidago nemoralis ssp. *nemoralis*	grey goldenrod	2	2	2	2	8	L5
Thalictrum dioicum	early meadow rue	2	3	3	2	10	L5
Viola sororia	common blue violet	2	2	0	2	6	L5
Physocarpus opulifolius	ninebark	3	2	5	4	14	pL3

Appendix 2a: List of flora species found in the Port Union Study Area only in 1997, and/or 2002, and/or 2005

Scientific Name	Common Name	Local Occur. 1-5	Popn. Trend 1-5	Hab. Dep. 0-5	Sens. Dev. 0-5	Total Score 2-20	Rank TRCA (03/2009)
Prunus pumila var. *pumila*	sand cherry	5		5		10	pL+?
Juniperus x *media*	pfitzer juniper	5				5	pL+
Picea pungens	Colorado spruce	5				5	pL+
Populus x *canadensis*	Carolina poplar	5				5	pL+
Salix x *sepulcralis*	weeping willow	4				4	pL+
Agrostis stolonifera	creeping bent grass	3				3	L+?
Atriplex patula	halberd-leaved orache	5				5	L+?
Chamaesyce cf. maculata	spotted spurge	5				5	L+?
Geranium robertianum	herb Robert	3				3	L+?
Asparagus officinalis	asparagus	4				4	L+
Caragana arborescens	Siberian pea-shrub	5				5	L+
Carduus cf. acanthoides	plumeless thistle	4				4	L+
Cerastium tomentosum	snow-on-the-mountain	5				5	L+
Convolvulus arvensis	field bindweed	4				4	L+
Epipactis helleborine	helleborine	3				3	L+
Euphorbia dentata	toothed spurge	5				5	L+
Iris germanica	garden iris	5				5	L+
Kochia scoparia	summer-cypress	5				5	L+
Lonicera tatarica	Tartarian honeysuckle	4				4	L+
Miscanthus sacchariflorus	eulalia	4				4	L+
Pinus sylvestris	Scots pine	3				3	L+
Potentilla recta	sulphur cinquefoil	3				3	L+
Prunella vulgaris ssp. *vulgaris*	heal-all (European)	5				5	L+
Pyrus communis	pear	4				4	L+
Rosa multiflora	multiflora rose	3				3	L+
Rosa rugosa	wrinkled rose	5				5	L+
Rudbeckia triloba	brown-eyed Susan	4				4	L+
Salix alba var. *alba*	white willow	3				3	L+
Salix purpurea	purple-osier willow	5				5	L+
Setaria viridis	green foxtail	4				4	L+
Silene vulgaris	bladder campion	4				4	L+
Sonchus asper ssp. *asper*	spiny sow-thistle	5				5	L+
Sonchus oleraceus	annual sow-thistle	5				5	L+
Spiraea x *vanhouttei*	bridalwreath spiraea	5				5	L+
Stachys palustris	marsh hedge-nettle	3	3	4	3	13	L+
Typha angustifolia	narrow-leaved cattail	3				3	L+
Viburnum lantana	wayfaring tree	4				4	L+

Appendix 3: List of Breeding Fauna Species Found in Port Union Study Area in 2007 and 2009.

COMMON NAME	CODE	Scientific Name	territories	LO	PTn	PTt	AS	PIS	HD	STD	+	TS	L-rank	comments
Survey Species: **species for which the TRCA protocol effectively surveys.**														
Birds														
yellow-billed cuckoo	YBCU	*Coccyzus americanus*	1	2	3	2	3	1	3	3	0	17	L3	
bank swallow	BANS	*Riparia riparia*	1	1	3	2	1	1	3	3	0	14	L4	
barn swallow	BARS	*Hirundo rustica*	not mapped	0	2	3	1	1	2	1	0	10	L4	
belted kingfisher	BEKI	*Ceryle alcyon*	1	0	3	2	2	1	2	2	0	12	L4	
blue-grey gnatcatcher	BGGN	*Polioptila caerulea*	1	1	1	1	3	1	1	3	0	11	L4	
eastern kingbird	EAKI	*Tyrannus tyrannus*	1	0	4	2	2	1	1	3	0	13	L4	
gray catbird	GRCA	*Dumetella carolinensis*	2	0	2	2	1	1	1	3	0	10	L4	
indigo bunting	INBU	*Passerina cyanea*	1	0	2	2	1	1	2	4	0	12	L4	
northern rough-winged swallow	NRWS	*Stelgidopteryx serripennis*	1	0	1	2	1	1	3	2	0	10	L4	
spotted sandpiper	SPSA	*Actitis macularius*	2	0	2	3	1	2	1	4	0	13	L4	
American Crow	AMCR	*Corvus brachyrhynchos*	not mapped	0	1	2	1	1	0	0	0	5	L5	
American goldfinch	AMGO	*Carduelis tristis*	not mapped	0	2	2	1	1	0	1	0	7	L5	
American robin	AMRO	*Turdus migratorius*	not mapped	0	1	2	1	1	0	1	0	6	L5	
Baltimore oriole	BAOR	*Icterus galbula*	not mapped	0	2	2	1	1	0	1	0	7	L5	
brown-headed cowbird	BHCO	*Molothrus ater*	not mapped	0	2	2	1	1	0	1	0	7	L5	
Canada goose	CANG	*Branta canadensis*	not mapped	0	1	1	1	2	1	0	0	6	L5	
cedar waxwing	CEDW	*Bombycilla cedrorum*	not mapped	0	1	2	1	1	0	1	0	6	L5	
common grackle	COGR	*Quiscalus quiscula*	not mapped	0	3	2	1	1	0	1	0	8	L5	
downy woodpecker	DOWO	*Picoides pubescens*	not mapped	0	3	2	1	1	1	1	0	9	L5	
killdeer	KILL	*Charadrius vociferus*	not mapped	0	2	2	1	2	0	2	0	9	L5	
mallard	MALL	*Anas platyrhynchos*	not mapped	0	2	2	1	2	0	1	0	8	L5	
mourning dove	MODO	*Zenaida macroura*	not mapped	0	2	2	1	1	0	0	0	6	L5	
northern cardinal	NOCA	*Cardinalis cardinalis*	not mapped	0	2	2	1	1	1	2	0	9	L5	
northern mockingbird	NOMO	*Mimus polyglottos*	not mapped	0	2	0	1	1	1	1	0	6	L5	
orchard oriole	OROR	*Icterus spurius*	1	2	2	1	1	1	0	1	0	8	L5	
red-winged blackbird	RWBL	*Agelaius phoeniceus*	not mapped	0	2	2	1	1	0	2	0	8	L5	
song sparrow	SOSP	*Melospiza melodia*	not mapped	0	2	2	1	2	0	2	0	9	L5	
warbling vireo	WAVI	*Vireo gilvus*	not mapped	0	1	2	1	1	1	2	0	8	L5	
yellow warbler	YWAR	*Dendroica petechia*	not mapped	0	1	2	1	1	1	3	0	9	L5	
European starling	EUST	*Sturnus vulgaris*	not mapped										L+	
house finch	HOFI	*Carpodacus mexicanus*	not mapped										L+	
house sparrow	HOSP	*Passer domesticus*	not mapped										L+	
Herpetofauna														
northern leopard frog	LEFR	*Rana pipiens*	1	0	3	2	1	4	2	5	1	18	L3	2002

Appendix 3: List of Breeding Fauna Species Found in Port Union Study Area in 2007 and 2009.

COMMON NAME	CODE	Scientific Name	territories	LO	PTn	PTt	AS	PIS	HD	STD	+	TS	L-rank	comments
Incidental Species: **species that are reported on as incidental to the TRCA protocol.**														
Mammals														
mink	MINK	*Mustela vison*	1	1	2	2	3	3	0	3	0	14	L4	
LEGEND														
LO = local occurrence		MR = mobility restriction												
PTn = population trend, continent-wide		STD = sensitivity to development												
PTt = population trend, TRCA		AP = additional points												
HD = habitat dependence		TS = total score												
AS = area sensitivity		L-rank = TRCA Rank, April 2003												

Appendix 4: Photographs of plantings found in the Port Union Study Area in 2010

Figure 1: Manicured area at southern edge pedestrian tunnel of (facing S).

Figure 2: Plantings just west of pedestrian tunnel and south railway (facing SW)

Figure 3: Plantings within manicured area near pedestrian tunnel (facing NNE).

Figure 4: Plantings along trail leading back to pedestrian tunnel (facing NE)

Figure 5: Plantings along lookout (facing SE)

Figure 6: Waterfront. Facing west from lookout area.

Appendix 4: Photographs of plantings found in the Port Union Study Area in 2010

Figure 7: Cobble- beach shoreline. View facing west.

Figure 8: Tamarack plantings near lookout (facing west).

Figure 9: Plantings along main trail (facing north)

Figure 10: Plantings along main trail (facing north).

Figure 11: Deciduous plantings along main trail (facing north)

Figure 12: Plantings along main trail (facing north)

Appendix 4: Photographs of plantings found in the Port Union Study Area in 2010

Figure 13: Plantings (facing east)

Figure 14: Plantings (facing east)

Figure 15: Cobble-stone beach before 1st headland (facing W)

Figure 16: Close –up of cobble-stone beach

Figure 17: Plantings amongst thick patches of field thistle.

Figure 18: Plantings among field thistle (*Cirsium arvense*).

Appendix 4: Photographs of plantings found in the Port Union Study Area in 2010

Figure 19: Cedar plantings between headlands 3 and 4.

Figure 20: Cedar plantings between headlands 3 and 4.

Figure 21: Cedar (towards back) and spruce plantings.

Figure 22: Condition of Sugar Maple plantings (*Acer saccharum ssp. saccharum*).

Figure 2: Exotic shrub, fragrant sumac *(Rhus aromatica)*.

Figure 24: Clumps of fragrant sumac (*Rhus aromatica*) planted at site.

Appendix 4: Photographs of plantings found in the Port Union Study Area in 2010

Figure 3: Condition of plantings along trail.

Figure 4: Condition of plantings along trail.

Figure 5: Section of trail where cedar plantings are being over-crowded by exotics.

Figure 28: Deciduous plantings

Figure 6: Mixed conifer and deciduous plantings

Figure 7: Deciduous plantings

Appendix 4: Photographs of plantings found in the Port Union Study Area in 2010

Figure 31: Overcrowding of maple plantings by exotics.

Figure 32: Deciduous plantings

Figure 8: Trembling Aspen (*Populus tremuloides*) plantings

Figure 35: Sugar Maple plantings (*Acer saccharum*)

Figure 9: Maple and poplar plantings (facing W).

Figure 37: Plantings along fence-line

Figure 38: Cottonwood (*Populus deltoides*) planting.

Figure 39: Sugar maple (*Acer saccharum*) planting showing signs of chlorosis.

Figure 40: Sugar Maple (*Acer saccharum*) showing signs of chlorosis.

Figure 41: Condition of Silver Maple (*Acer sacharinum*) planting.