



Clubine Tract

Terrestrial Biological Inventory and Assessment

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Toronto and Region
Conservation
for The Living City®

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1.0 Introduction

In 2011, the Toronto Region Conservation Authority (TRCA) conducted flora and fauna inventories of the natural cover associated with Clubine Tract (Map 1), which is a TRCA owned property in the north-east corner of the jurisdiction. These inventories were required in order to inform an update of the management plan for the property. Clubine Tract had not received any biological surveys since 2000 when a fauna inventory was conducted across the same study area.

The purpose of the work conducted by the TRCA during the 2011 field season was to *provide site-specific advice on management decisions* for the upcoming plan. In order to provide this advice detailed field work was undertaken to *characterize the terrestrial natural heritage features* of Clubine Tract study area. Once characterized, 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 Clubine Tract 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.

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 (TNHSS) 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.

The natural cover at Clubine Tract, albeit small, provides an important link in the natural system along the Oak Ridges Moraine. The site helps to connect the forest blocks of the Goodwood-Secord area to its west with the larger more extensive East Duffin Headwaters forest complex to its east.

2.0 Study Area Description

As shown in Maps 1 and 2, the study area is located at the extreme north end of the Duffins watershed, running west to east for 1 km from the 4th Concession, south of Regional Road 21, in the municipality of Uxbridge, Durham Region. The study area covers 38 ha and lies close to the northern edge of the Oak Ridges Moraine. The site is entirely within the Great Lakes – St. Lawrence floristic region and is composed of mixed coniferous-deciduous forest. Surface geology of the majority of the site consists of the sand and gravel associated with glacial river deposits (there is a working aggregate extraction business in operation just to the south of the study area); however the eastern half of the site is dominated by the finer sand and gravels associated with ice-supported stratified deposits which are a feature of this eastern end of the Oak Ridges Moraine within the Toronto region. The Oak Ridges Trail runs the entire length of Clubine Tract and there is a network of smaller trails criss-crossing throughout the conifer plantations that dominate the site.

3.0 Inventory Methodology

A biological inventory of Clubine Tract 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 taken 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 undertaken in 1996-2000 and ranks are reviewed regularly (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 as 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 (see Section 3.2).

Quality Distribution of Natural Cover

The quality of each habitat patch is evaluated according to three criteria: *size* (the number of ha 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 3 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, 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 amount of natural cover needed in the landscape is based on the quantity required 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 Communities, Flora and Fauna 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.

Botanical field-work for the site was conducted in 2011 during the months from May to September. 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 2008 digital ortho-rectified photographs (ortho-photos) to a scale of 1:2000 and then digitized in ArcView. Flora regional species of concern (species ranked L1 to L3) were mapped as point data with approximate number of individuals seen. A list of all other species observed was documented for the site.

The most complete fauna survey of the site was conducted by the TRCA in May and June 2011. No spring surveys for frogs were conducted since it was apparent that there are no wetlands within the study area. Surveys in May and June were concerned primarily with the mapping of breeding bird species of regional concern. As per the TRCA data collection protocol, breeding bird surveys were carried out by visiting all parts of the 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 were completed by the end of the third week of June. The field-season is 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.

A similar fauna survey of the study area had been conducted in 2000; although some comparison can be made between data collected in the two years it is important to note that the TRCA's fauna data management protocol imposes a 10 year threshold on use of historical data, and therefore the results of the TRCA fauna surveys conducted in 2000 have not been included in the species list prepared for this report.

Table 2. Schedule of TRCA biological surveys at Clubine Tract in 2011

Survey Item	Survey Dates	Survey Effort (hours)
Patch / Landscape	2007/08: ortho-photos	21 hours
Vegetation Communities and Flora Species	2011: May 20 th , July 22 nd , and August 26 th	21 hours
Breeding Songbirds	2011: May 26 th and June 23 rd	4.5 hours

4.0 Results and Discussion

Information pertaining to Clubine Tract 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 2007/08 ortho-photography, 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. 2007/08) only about 17% is covered by forest (includes successional) and wetland. Of the non-natural cover (i.e. the remaining 75%), 48% is urban and 27% 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 16.7% of the surface area of the jurisdiction (Map 3). In addition, meadow cover stands at 8.1% of the region. 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 Clubine Tract

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 2007/08 ortho-photos.

4.2.1 Quantity of Natural Cover

The area of the Duffins Creek watershed is approximately 28,654 ha containing 40.7% natural cover, including 8,158 ha as forest (28.4%), 3,002 ha as meadow (10.5%) and 505 ha as wetland (1.8%). Clubine Tract contains 0.3% of the total natural cover in the Duffins watershed. Although this proportion may seem small, the study area provides an important connection between the extensive forest complex of the East Duffins Headwaters and the less extensive but likewise significant forest blocks of the Goodwood-Secord area.

The Clubine Tract study area covers about 38.3 ha of which 37.8 ha is natural cover (Appendix 1). The natural cover at the site is entirely forested – either with conifer plantations or mixed forest.

4.2.2. 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 study area consists of a rectangular block of conifer plantations, abutting a section of more natural mixed forest in the eastern third of the site. This latter section is part of a more extensive patch of mixed deciduous forest which abuts further conifer plantations to the east. Since these forests are connected and are considered one habitat patch, the study area receives a “good” score for patch size (Map 5).

Clubine Tract is part of a much larger and more irregularly shaped forest complex which receives an overall “poor” score for patch shape. However, patch shape should not be considered in isolation from patch size. Given the large size of the overall forest patch, despite the irregular shape of the patch, there are extensive areas of interior forest habitat much of which extends into the study area, even to the extent of there being a small area of 300-400m forest interior at the east end of the block (Map 6).

Habitat Patch Matrix Influence

Analysis based on the 2007/08 ortho-photos shows that the matrix influence score for habitat in the study area is “good” (Maps 7 and 8). Despite the presence of an active aggregates operation directly to the south of Clubine Tract, this score is expected given the rural setting and the positive influence exerted by the expanse of natural area adjoining the study area on the eastern side.

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” habitat patch size and “poor” patch shape, results in an overall “good” or L3 habitat patch quality (Map 9). Landscape scores are intended to be applied at the broader landscape level and therefore caution needs to be exercised when referring to such measures at the more refined site level.

4.3 Vegetation Community Findings for Clubine Tract

4.3.1 Vegetation Community Representation

Clubine Tract supports a total of nine different ELC vegetation community types; there are eight forest communities (4 natural and 4 plantation) and 1 successional community (Appendix 1; Map 10).

Table 3. Summary of Vegetation Communities, Clubine Tract

Class	Number of Types	Area (hectares)
Forest	8	37.0
Successional	1	0.8
<i>Total</i>	9	37.8

Conifer plantation, of which there are four types, accounts for nearly three quarters of the total forest cover at Clubine Tract (28.0 ha). Single and multi-species conifer plantations mainly consisting of white pine (*Pinus strobus*), red pine (*Pinus resinosa*) or Scots pine (*Pinus sylvestris*) occur most frequently while those with white spruce (*Picea glauca*), Jack pine (*Pinus banksiana*), and Norway spruce (*Picea abies*) occur to a lesser extent. Within the study area White Pine Plantation (CUP3-2) and Mixed conifer plantation (CUP3-H) provide the greatest proportion of cover; they total 12.0 ha and 8.8 ha respectively. Collectively, the Red Pine Coniferous Plantation (CUP3-1) and Scots Pine Coniferous Plantation (CUP3-3) contribute ~7.1 ha of natural cover.

Although conifers dominant the study area, situated within the site's north-eastern reaches are intact fragments of naturally occurring mid-aged to mature deciduous and mixed forest. These communities account for the remaining ~25% of natural cover at the site. There are two purely deciduous forest types (6.2 ha) and two mixed forest types (2.1 ha). The largest is a mature Dry-Fresh Sugar Maple - Hickory Deciduous Forest (FOD5-5) that consists entirely of native species in all levels of the canopy. Interspersed within the same vicinity are smaller, slightly younger, patches of Dry-Fresh Red Oak Deciduous Forest (FOD1-1), Dry-Fresh Hemlock – Sugar Maple Mixed Forest (FOM3-2) and Dry-Fresh White Pine – Sugar Maple Mixed Forest (FOM2-2). Common associates include: Sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), American beech (*Fagus grandifolia*), American basswood (*Tilia americana*) and, on the cooler slopes, Eastern Hemlock (*Tsuga canadensis*).

Successional semi-wooded communities cover only 0.8 ha and is represented by a solitary Treed Hedgerow (CUH1-A) that runs along the north portion of the site near the western corner. The community consists of a narrow band of mature deciduous trees with a ground layer that is heavily dissected with trails that lead into deeper regions of the site.

Disturbance to the vegetation communities arise from two main sources: invasive species and trails. Exotic species are most prominent in the plantations and along various sections of the trail

system. Herbaceous species such as dandelion (*Taraxacum officinale*) and herb robert (*Geranium robertianum*) were dominant in the ground layer, but of greater concern is the prevalence dog-strangling vine (*Cynanchum rossicum*), an aggressive exotic vine, that was recorded in more than half of the plantations at the site. In addition, European buckthorn (*Rhamnus cathartica*), an exotic woody species, with the potential to reach tree height, is rapidly regenerating in the understory. The more mature mixed forests are relatively free of exotics, except where they are close to the trail network. The main trail – running the length of the site - is likely used all year round by outdoor enthusiasts including hikers and cyclists but the use does not appear to be particularly intense.

4.3.2 Vegetation Communities of Concern

The vegetation communities that occur in the TRCA jurisdiction are scored and given a local rank from L1 to L5 based on the two criteria mentioned in Section 3.0. Vegetation communities with a rank of L1 to L3 are considered of concern across the entire jurisdiction while L4 communities are considered of concern in the urban portion of the jurisdiction. Clubine Tract lies within the rural landscape and therefore only L1 to L3 communities are considered as being of conservation concern.

There is one vegetation community of regional conservation concern (L1 to L3) at Clubine Tract (Appendix 1; location and boundaries shown on Map 10). Dry-Fresh Red Oak Deciduous Forest (FOD1-1) has an L-rank of L2 and occupies 1.8 ha, 5 % of the total natural cover. This vegetation community type has very specific geophysical requirements that limit its ability to establish in a given area. Generally preferring well-drained, sandy soils, such as those on the moraine, it is considered rare in the jurisdiction (seen in fewer than 13 of the forty-four 10x10 km UTM grid squares that cover the TRCA jurisdiction).

It should be noted that community ranks do not take into account the intactness or quality of individual examples of communities; thus a common type of vegetation community may be of conservation concern at a particular site because of its age, intact native ground layer, or other considerations aside from rank. For instance, the ground layer of the mature Dry-Fresh Sugar Maple – Hickory Forest (FOD5-5) seen at the north-eastern end of the study area has a good representation of sedges, ferns, and spring ephemerals, so although it may belong to a relatively common and adaptable vegetation type it should still be considered of high conservation concern.

4.4 Flora Findings for Clubine Tract

4.4.1 Flora Species Representation

Floristic surveys conducted by TRCA in 2011, identified a total of 183 species of vascular plants (Appendix 2). These included 178 naturally-occurring species and 5 planted species. Of the non-planted species, 132 are native (74%). Overall Clubine Tract has a relatively low biodiversity. This

is not unexpected as the site is dominated by conifer plantations which generally support fewer species, especially when compared to undisturbed, natural forest communities of similar size. However, these plantings can create conditions favourable for certain native species, e.g. through the production of a slow-to-decay duff layer.

Table 4. Summary of Flora Species, Clubine Tract

Total # of species	183
Naturally-occurring species	178
Planted species	5
Native (naturally-occurring) species	132
Number of L1 - L3 species	33

4.4.2 Flora Species of Concern

There are 33 vascular plant species of regional conservation concern (rank L1 to L3) at Clubine Tract. Appendix 2 lists plant species by ranks and locations are shown on Map 11. The ranks are based on sensitivity to human disturbance associated with development and habitat dependence, as well as on rarity (TRCA 2010).

Five of these L1 to L3 ranked plants are regionally rare (found in six or fewer of the forty-four 10x10 km UTM grid squares that cover the TRCA jurisdiction). Some examples of regionally-rare plants at Clubine Tract include: pipsissewa (*Chimaphila umbellata ssp. cisatlantica*), downy arrow-wood (*Viburnum rafinesquianum*), low bindwind (*Calystegia spithamea ssp. spithamea*) and wild licorice (*Galium lanceolatum*).

All of the flora species of concern at Clubine Tract are sensitive to development; being vulnerable to at least one kind of disturbance that is associated with land use changes (see Map 7 for sensitivity to development scores).

Invasive species – notably dog-strangling vine, are also a threat to forest flora of concern at this site such as wild columbine (*Aquilegia canadensis*), sharp-lobed hepatica (*Anemone acutiloba*) and partridgeberry (*Mitchella repens*).

Increased human traffic into a natural area results in disturbance caused by trampling and also facilitates incursion of invasive species that compete with the existing native flora. The heaviest trampling (due to pedestrian and bike trails) is in the northern part of Clubine Tract. The forest patches here include sensitive species such as Dutchman’s breeches (*Dicentra cucullaria*), broad-leaved spring beauty (*Claytonia caroliniana*), and mitrewort (*Mitella diphylla*).

Habitat fragmentation can lead to increased populations of herbivores such as white-tailed deer (*Odocoileus virginianus*); deer have had significant impacts in parts of the TRCA jurisdiction such

as Rouge Park. Evidence of deer browse was ever-present at Clubine Tract, but seems not yet to have attained severe levels.

In addition to being sensitive to land use impacts, all of the species of concern can be considered habitat specialists, scoring relatively high in *habitat dependence*. Habitat dependence scores are shown on Map 12. Roughly, they are found in seven or fewer vegetation cohorts (groupings of vegetation types with similar floristic characteristics) (TRCA 2010). They will not readily recover when these habitats are lost or altered. Clubine Tract has habitat specialists corresponding to all of its main habitat types.

Upland species at Clubine Tract included leatherwood (*Dirca palustris*); a native shrub found in only a few known locations across the jurisdiction. Spring ephemerals were well-represented and included: sharp-lobed hepatica, broad-leaved spring beauty, squirrel-corn (*Dicentra canadensis*) and large-flowered bellwort (*Uvularia grandiflora*). There is also the myco-heterotroph Indian pipe (*Monotropa uniflora*). (The term indicates plants that are parasitic on fungi that in turn have mycorrhizal associations with trees – hence these species have an added layer of habitat specialization. Their presence implies a robust, healthy fungal association in the forest).

Invasive Species

Clubine Tract is a floristically average to poor natural area; the presence of invasive species at the site and largely monotonous community types has led to a relatively low site biodiversity. The extensive planting and plantation management at the site has provided numerous pathways for invasive species to enter into the site.

There is a large (but local) population of dog-strangling vine in the plantations throughout the site. This plant is a formidable threat (TRCA 2008). If it follows the trajectory it has taken in Rouge Park and the Seaton Trail / Whitevale Corridor in Durham Region, it will likely become the dominant ground layer species in most upland habitats except for mature forests. Biological control is the best long-term hope for dealing with it. It is possible that the Clubine Tract population is still localized enough that chemical and mechanical methods of control may be attempted.

Garlic mustard appears to be occurring in those communities that are successional and/or disturbed in nature. It is likely to spread along trail systems. At present, infiltration of this species into the healthier sections of the site is minimal.

The remainder of the other non-native species occurring at the site are weedy annual and perennial species that exhibit less aggressive tendencies. They generally occur in the more open and semi-open regions of the site or within communities adjacent to disturbance pathways such as road corridors or trail systems. Although prevalent, they do not pose a significant threat to the overall native species biodiversity.

4.5 Fauna Species Findings for Clubine Tract

4.5.1 Fauna Species Representation

The TRCA fauna surveys at Clubine Tract in 2011 documented a total of just 26 bird species, 5 mammals, and 1 herpetofauna species, bringing the total number of possible breeding vertebrate fauna species identified by the TRCA to 32. Mourning warbler (*Geothlypis philadelphia*), reported in 2000, was not found in 2011 but was heard singing in the adjacent forest.

This total is surprisingly low and is likely a result of the limited variety of habitat opportunities provided by the extensive conifer plantations that constitute almost 75% of the site. It should be noted that additional species (mourning warbler; scarlet tanager, *Piranga olivacea*) were heard singing in the forest just beyond the study area boundary, and it is highly likely that such observations involve individuals and species which maintain territories that intersect with the current study area. However, even with the inclusion of these two species the total is still rather low. 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 conservation concern if they rank L1 to L3 based on their scores for the seven criteria mentioned in Section 3.0. Since this site is situated within the rural zone this report does not consider in detail 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 Clubine Tract reported four bird species of regional concern (all of which are ranked as L3): brown creeper (*Certhia americana*), pine warbler (*Setophaga pinus*), yellow-rumped warbler (*Setophaga coronata*), and ovenbird (*Seiurus auracapilla*). Observation of evidence of hairy-tailed mole (*Parascalops brewerii*) on the site brings the total number of species of concern at the site to five. Again, this is a surprisingly low total but it is the presence of L3 species at this site which differentiates the species list for Clubine Tract from similarly sized urban sites such as Moatfield Farm Park, a site with a fauna list of 46 species which includes no L1 to L3 species. It should be noted that there are no wetland habitat elements within the study area which restricts the opportunities for a higher biodiversity (e.g. for additional frog species). Locations of these breeding fauna are depicted on Map 13.

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).

At Clubine Tract two species occur that are considered regionally rare: yellow-rumped warbler and hairy-tailed mole. The latter species, habitually fossorial (adapted to subterranean living), is certainly under-recorded by the TRCA's fauna survey protocol which targets more vocal and generally diurnal species. The presence of yellow-rumped warbler is more significant, especially given that at least three territories were identified during the 2011 survey.

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, *Sciuridae*; raccoons, *Procyon lotor*; and house cats, *Felis catus*); 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 study area all five species that are ranked L1 to L3 receive this score and are therefore considered sensitive to one or more of the impacts associated with development (Map 8).

One particularly sensitive bird species, the ovenbird, was well-represented at the site with a total of 9 territories within the 38 ha study area. This density – roughly one territory for every 4 ha – compares favourably with the density of ovenbirds in other, larger rural forest blocks. In some respects the number of ovenbird territories on the site is a better indication of ecological function than the number of species on site, certainly as far as an indication of the level of impacts from matrix influence. The relatively high density of ovenbirds indicates a forest habitat that is not currently subject to excessive disturbance. Ground-nesting birds are 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.

There is a fairly extensive network of trails throughout the study area, mostly associated with the conifer plantation, but use – at least on weekdays when fauna surveys were conducted – does not appear to have reached the level of intensity that would significantly reduce the number of ovenbirds on site. The terrain does not lend itself to mountain biking and it may be that the limited parking opportunities keep the number of dog-walkers to a minimum. With this in mind it is

surprising that the species list for the site is so low, however, in this case, it is likely that this is a result of habitat quality rather than matrix influence.

Higher ranked species are persisting at this site because the landscape is still entirely rural. However, it is important to understand that any increase in the amount of trail traffic will result in increases in negative matrix influences which 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. Similarly, clearing of forest understory to accommodate trails will displace such sensitive species.

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 ha in total) score the maximum five points, while species that either show no minimum habitat requirement, or require <1 ha in total, score one point. Species scoring three points or more (require ≥ 5 ha 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).

All four of the bird species of regional concern that were identified at Clubine Tract are considered area sensitive, including two species – ovenbird and pine warbler - that require at least 20 ha of habitat. All of these species are forest species and as such are well-accommodated by the 38 ha of forest that constitute the study area, and then even more so by the fact that this study area is part of a continuous block of forest amounting to 110 ha. With this in mind the site could certainly readily accommodate (from an area perspective) even more area sensitive species such as the larger hawk and owl species, black-and-white warbler (*Mniotilta varia*) and even species as sensitive as whip-poor-will (*Caprimulgus vociferus*). Likewise, area sensitive mammal species such as porcupine (*Erethizon dorsatum*) are probably present on site but were not reported during the 2011 field season.

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 frequently disturbed by human intrusion, such species will be liable to abandon the site. Such a variety of habitat needs are more likely satisfied within a larger extent of natural cover. The few forest bird species which are currently well-represented on the site benefit considerably from the extent of their potential nesting habitat, ensuring that, despite some degree of disturbance from the small number of visitors and dogs, there are currently probably enough successful nestings for populations of these species to be maintained.

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 road-kill). 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.

Hairy-tailed mole is the only species of regional concern recorded at Clubine Tract that scores high for patch isolation sensitivity. As individuals of this subterranean species move across the local landscape they are occasionally forced to the surface by changes in substrate. This becomes more of an issue when their environment is traversed by heavily compacted trails, forcing the animals to the surface more often and thereby increasing predation and the chance of exposure to unsuitable weather.

Generally, the group of fauna for which patch isolation sensitivity is an issue is the herpetofauna: turtles, frogs and snake species. Many herpetofaunal species are highly mobile, moving considerable distances across the local landscape to and from breeding and wintering habitats. The lack of any wetland elements within the study area initially implies that such species are unlikely to be present. However, if there are any small ponds located within the local landscape, for example, associated with any of the residences along Regional Road 21, then it is possible that several such species may be using the forest habitat at Clubine Tract as non-breeding habitat – i.e. for summer foraging and overwintering. An increase in the bicycle use of the network of trails throughout the site would put such species at some risk of becoming road-kill.

Fauna species that score greater than three points under the **habitat dependence** criterion are considered habitat specialists (Map 14). These species exhibit a combination of very specific habitat requirements that range from the 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. Just two fauna

species that occur in the study area (ovenbird and pine warbler) are considered habitat specialists; both are dependent on forest habitats.

Richness is essentially the presence or absence of species at a site. Beyond mere presence of single species is the idea that a natural system can be considered 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 such a low number of forest dependent species suggests that the forest habitat in the study area is functioning at a rather low level despite the presence of extensive forest habitat. Often, the absence of such forest-dependent species in a forest block can be attributed to negative matrix influences. This does not appear to be the case at Clubine Tract. Although it is possible that high levels of activity at the neighbouring aggregate extraction site could have some negative impact on the presence of more sensitive forest species, it seems more likely that the rather poor diversity and quality of the habitat provided by the conifer plantation blocks is restricting the opportunities for nesting birds. Extensive conifer plantations require management to enhance the nesting and foraging opportunities available.

5.0 Summary and Recommendations

The recommendations for Clubine Tract 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 Clubine Tract study area within the regional context, followed by specific recommendations.

5.1 Site Summary

1. The site comprises upland forest on the Oak Ridges Moraine, with no wetland elements within the site boundaries.
2. Nine vegetation types were observed, ranging in age from mid-aged to mature. The site includes eight forest, and one successional vegetation community types.
3. Fairly intact deciduous forest communities, such as a regionally rare (L2 ranked) Dry-Fresh Red Oak Deciduous, were dominated by a variety native ephemerals and rare shrubs.
4. The site holds 183 species of plants, including 33 species of regional concern (L1 to L3); many of these are associated with deciduous forest habitats within the study area.

5. Of the 33 L1 to L3 ranked plant species identified, 5 are also considered to be regionally-rare. Several, including leatherleaf, have few known locations in the TRCA jurisdiction.
6. Although a relatively small site, the study area fills an important connecting role between the larger Glen Major forest complex and the Goodwood/Secord forest blocks on the Oak Ridges Moraine.
7. The site incorporates extensive forestry plantations which present excellent opportunities for the monitoring of the effects of plantation management.
8. A very low total of 32 vertebrate fauna species were observed – a total which is lower even than some large urban sites within the jurisdiction. However, the species list does include several L3 species which would not be present in urban forests of the same size.
9. Given the large extent of the forest habitat patch, the area is surprisingly depauperate in variety of nesting forest bird species, despite seemingly low visitor pressure. However, the nesting density of ovenbirds is quite high, implying that the current conditions in the forest block favours this sensitive ground-nesting species.
10. Although there is an extensive network of trails, many of these trails appear not to be heavily used, with perhaps only the main trail carrying users straight through this longitudinal section of the Oak Ridges Trail system.

5.2 Site Recommendations

In order to foster a healthy level of biodiversity at Clubine Tract, the overall integrity of the natural heritage system that includes the site must be protected and enhanced. Currently, levels of disturbance at the site do not appear to be a severe problem, and certainly the forest habitat is extensive enough to meet the requirements of most forest species within the TRCA region. It seems likely that the surprisingly low fauna biodiversity at the site is a result of the limited variety of habitat opportunities provided by the extensive conifer plantations.

Given the prospects for increased trail use, any improvements in habitat quality and integrity must be protected from the negative matrix influences associated with such trails. This will require the strategic management of public use, allowing healthy dynamic natural processes to proceed, and the control of invasive species.

The following recommendations address the above natural heritage concerns, with an emphasis upon improving the natural heritage opportunities within the existing forest features on site. Thus, we recommend overall that 1) existing habitats and features be protected and enhanced; 2) public use be managed; 3) invasive species be controlled; and 4) further assessment and monitoring be undertaken.

1. Protect and Enhance Existing Features

The first priority should be to focus on ***maintaining conditions that allow existing communities or species of conservation concern to thrive***. This is especially true of the high density population of ovenbirds spread throughout the site. However, in parallel with this conservative approach, management needs to work towards ***improving habitat conditions, allowing recruitment of new communities or species of conservation concern***, working towards realization of the full potential of this extensive and currently relatively undisturbed forest block.

- a. The current management plan for the conifer plantation includes judicious thinning, continuing in 2014. Such thinning will create opportunities for an increase in ground cover and understory shrubs, thereby creating more varied structural layers which will in turn increase the available habitat niches for a wider variety of fauna species (e.g. mourning warbler; black-throated blue warbler, *Setophaga caerulescens*; hooded warbler, *Setophaga citrina*; and Canada warbler, *Cardellina canadensis*). It is important that such management be conducted in a way that will reduce the invasion of non-native species such as dog-strangling vine and garlic mustard. This may require pre-emptive planting of a native shrub and ground layer in addition to the planned native hardwood plantings.
- b. Management zones should be delineated for the study area in the management plan that emphasizes protection of existing natural heritage features from user impacts, i.e. vegetation communities, plant or animal species of high conservation rank.
- c. Clubine Tract is completely forested so there are no opportunities for the expansion of natural areas. However, in the surrounding landscape, property owners could be recruited to increase natural cover through strategic plantings and restoration of agricultural fields and manicured areas. This will improve habitat patch size and shape, and help reduce negative matrix influences. Other considerations that such off-site actions might address are improving habitat connectivity along the Oak Ridges Moraine corridor; buffering existing vegetation communities or species of conservation concern (maintaining conditions that allow these species to thrive and expand); increasing interior forest conditions; and reinforcing the potential for a rich avifauna, notably the particularly good numbers of ground-nesting forest species.

2. Manage Public Use

Although landscape metrics indicate that the matrix influence at this rural site is largely positive, this does not take into account the disturbance that may occur along the extensive network of roads and trails. Visitor pressure is likely to increase and ***it is***

important to pre-empt any potential increase in user pressure by designing the trail network to minimize negative impacts on sensitive forest species.

- a. The small size and rather linear shape of this site precludes the necessity for anything more than a simple linear trail running through the centre of the site. Side trails running off of this central spine simply bring hikers to the nearby edge of the forest block, overlooking either residential properties (to the north) or the aggregate extraction site (to the south). The terrain through this forest block is uniformly flat and does not lend itself to any interesting cycling opportunities. It is recommended that all trails other than the central corridor be decommissioned in an attempt to allow breeding fauna species to be recruited into the forest habitat.
- b. Dogs should be either excluded from the site or, at the very least, the leash-by-law should be properly enforced, bolstered by effective interpretive signs indicating the presence of sensitive ground-nesting birds throughout the site.

3. Control Invasive Species

Several invasive plant species are threats to the native biodiversity at Clubine Tract. ***It is essential that well-planned and realistic measures be undertaken to control invasive species.*** Management for invasive species will need to be tailored to the individual species in question, depending on how wide-spread and established they are.

- a. The highest-priority invasive species at Clubine are dog-strangling vine, garlic mustard, and buckthorn. These are currently present in large but well-circumscribed populations. Some of them may be manageable through mechanical and/or chemical control.
- b. Invasive species control should be undertaken as a proactive measure prior to planting around any fields that are being targeted for restoration. This would include removal of Scots pine (*Pinus sylvestris*) along with the other priority species.

4. Further Assessment and Monitoring

In order to assess the impacts of any forestry management and the efficacy of trail management ***some monitoring projects should be initiated at Clubine Tract.***

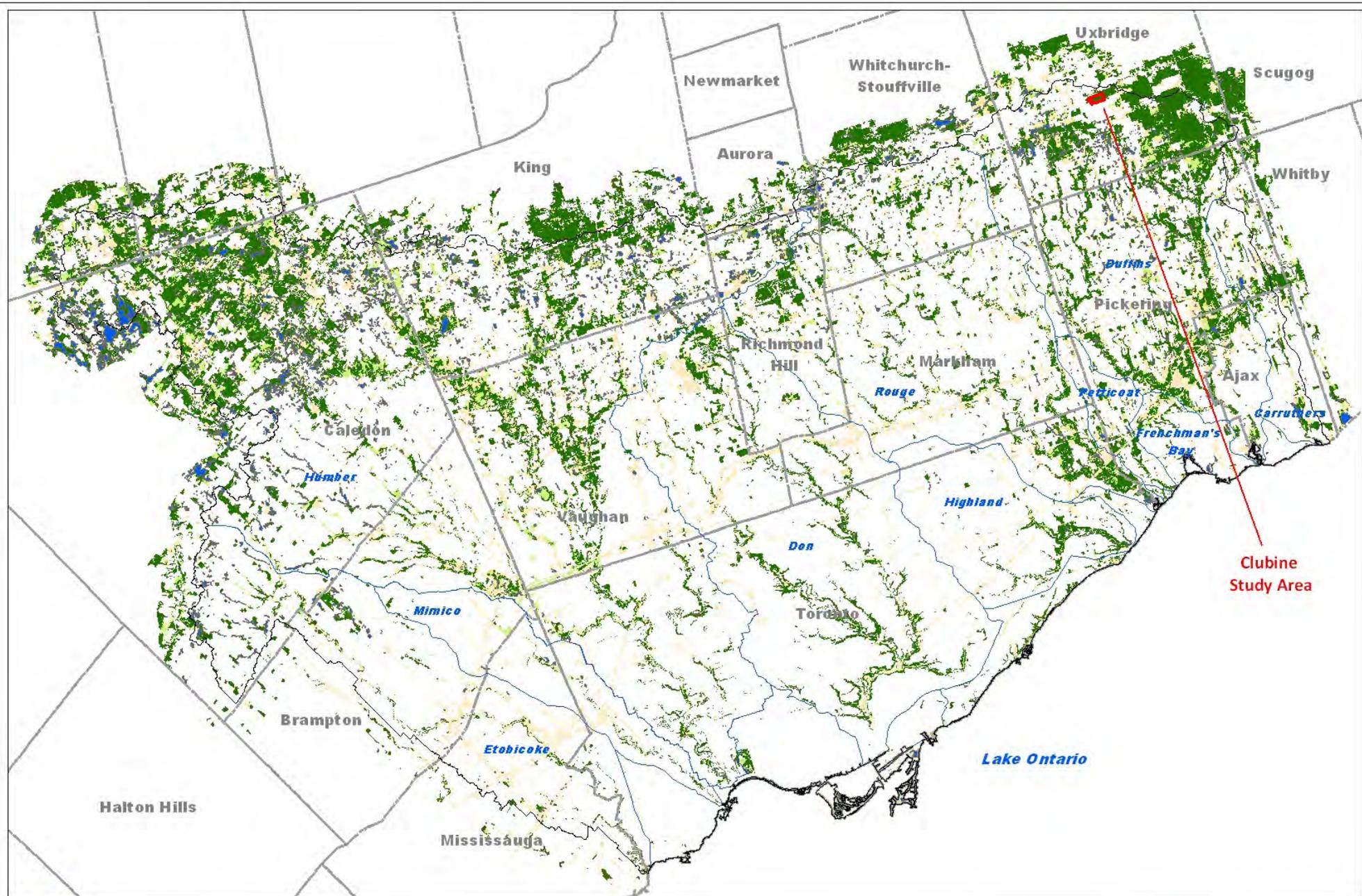
- a. Long-term monitoring plots should be installed at the study area, including a forest vegetation plot and a forest bird plot following the same protocol as is used in the TRCA's regional long-term monitoring program.

- b. A search for red-backed salamanders (*Plethodon cinereus*) should be conducted with a view to monitoring the population using the current TRCA long term monitoring protocol for Plethodontid salamanders.

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Date: November 2012
 * Landscape analysis based on 2007/2008 Orthophotography

Map 1:
Clubine Study Area in the
Context of Regional Natural Cover

Natural Cover *		Legend	
	Forest		Clubine Study Area Boundary
	Successional		TRCA Jurisdiction
	Meadow		Watershed
	Wetland		Municipal Boundary
	Beach/Bluff		



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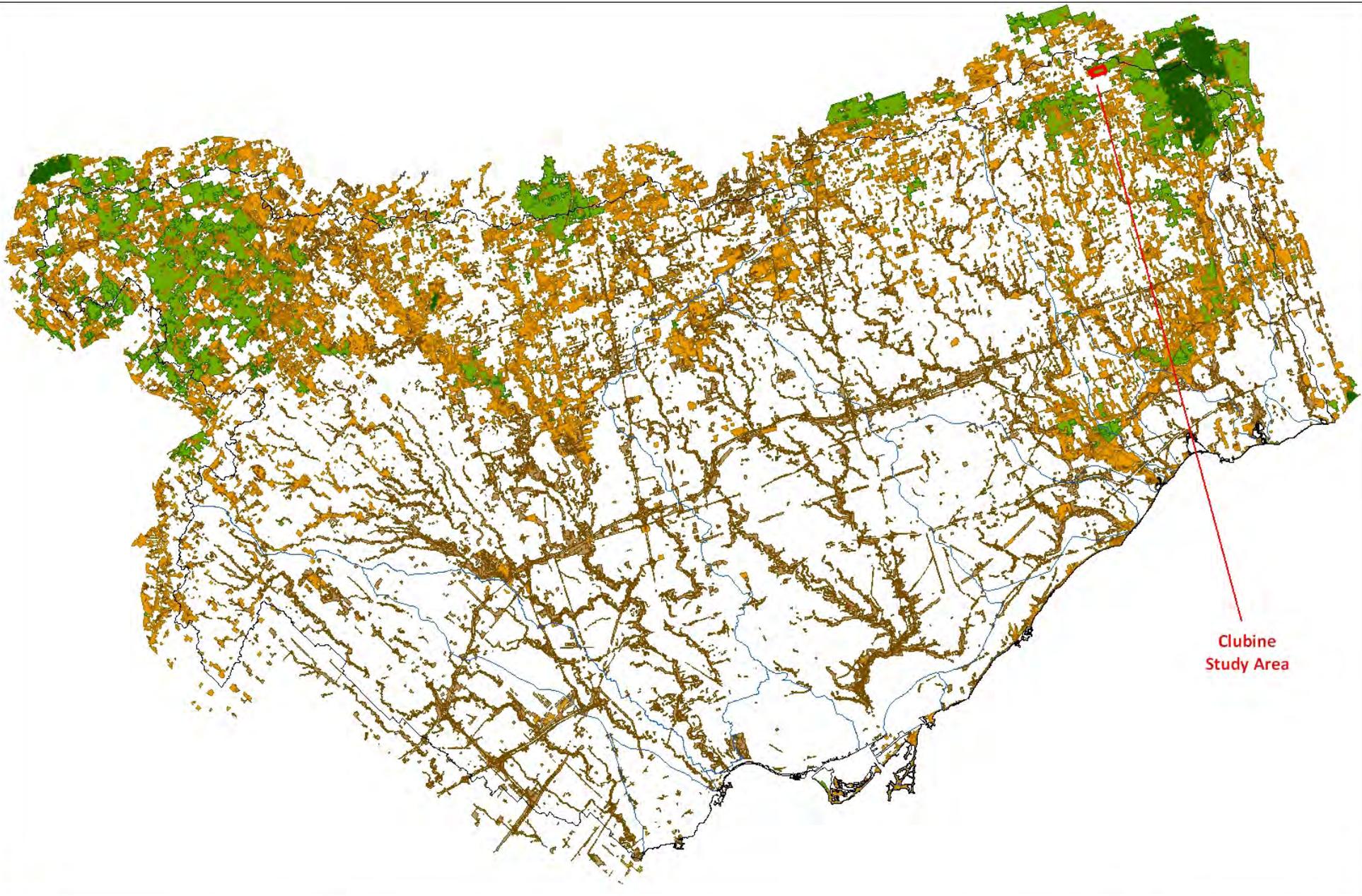
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Date: November 2012
Orthophoto: Spring 2008, First Base
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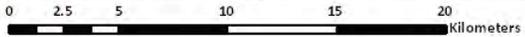
Map 2: Clubine Study Area

Legend

 Clubine Study
Area Boundary



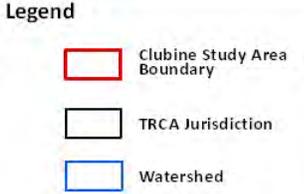
Clubine Study Area

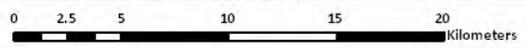
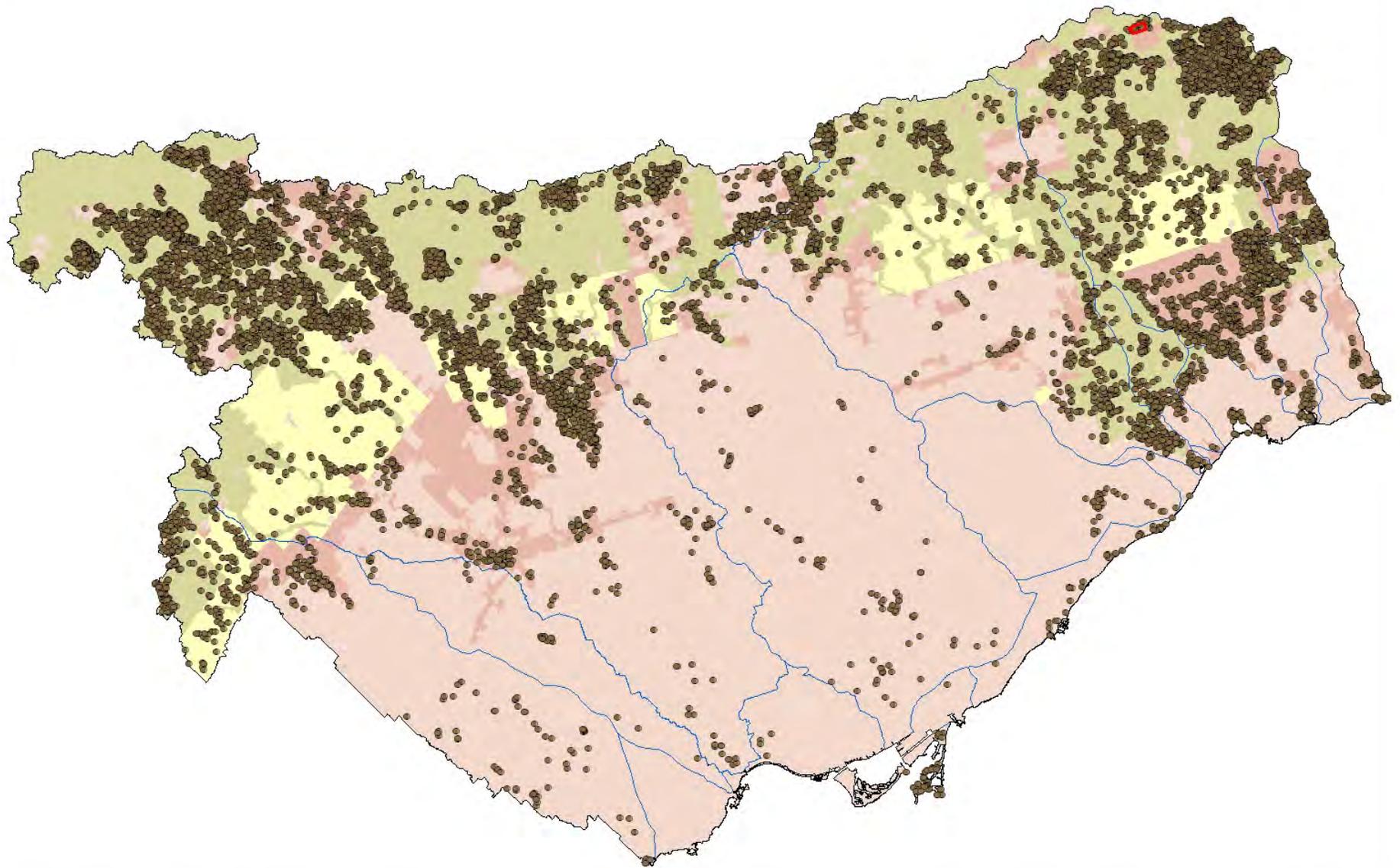


Date: November 2012

* Landscape analysis based on 2007/2008 Orthophotography

Map 3: Regional Natural System Habitat Patch Quality





Map 4:
Distribution of Fauna
Regional Species of Concern

Legend

-  Fauna Species of Concern (L1 - L3)
-  Clubine Study Area Boundary
-  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



0 25 50 100 150 200 Meters

Date: November 2012

Orthophoto: Spring 2008, First Base Solutions Inc.

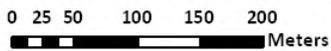
* Landscape analysis based on 2007/2008 Orthophotography

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

Legend

- Clubine Study Area Boundary

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



Map 6: Interior Forest at Clubine

Legend

- Clubine Study Area Boundary
- Forest
- Forest Interior**
- 100m-200m
- 200m-300m
- 300m-400m
- 400m-500m
- 500m-600m
- 600m-700m

Date: November 2012
 Orthophoto: Spring 2008, First Base Solutions Inc.
 * Landscape analysis based on 2007/2008
 Orthophotography



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



0 25 50 100 150 200 Meters

Date: November 2012

Orthophoto: Spring 2008, First Base Solutions Inc.

* Landscape analysis based on 2007/2008 Orthophotography

Map 7: 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

□ Clubine Study Area Boundary



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



0 25 50 100 150 200 Meters

Date: October 2012
 Orthophoto: Spring 2011, First Base Solutions Inc.
 * Landscape analysis based on 2007-2008 Orthophotography

**Map 8:
 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

□ Clubine Study Area Boundary



0 25 50 100 150 200
Meters

Date: November 2012
 Orthophoto: Spring 2008, First Base Solutions Inc.
 * Landscape analysis based on 2007/2008
 Orthophotography

Map 9: Habitat Patch Quality

Legend

Habitat Patch Quality *

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

Clubine Study Area Boundary



0 25 50 100 150 200 Meters

Date: November 2012
 Orthophoto: Spring 2008, First Base Solutions Inc.

Map 10: Vegetation Communities with their Associated Local Ranks

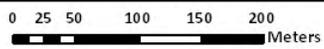
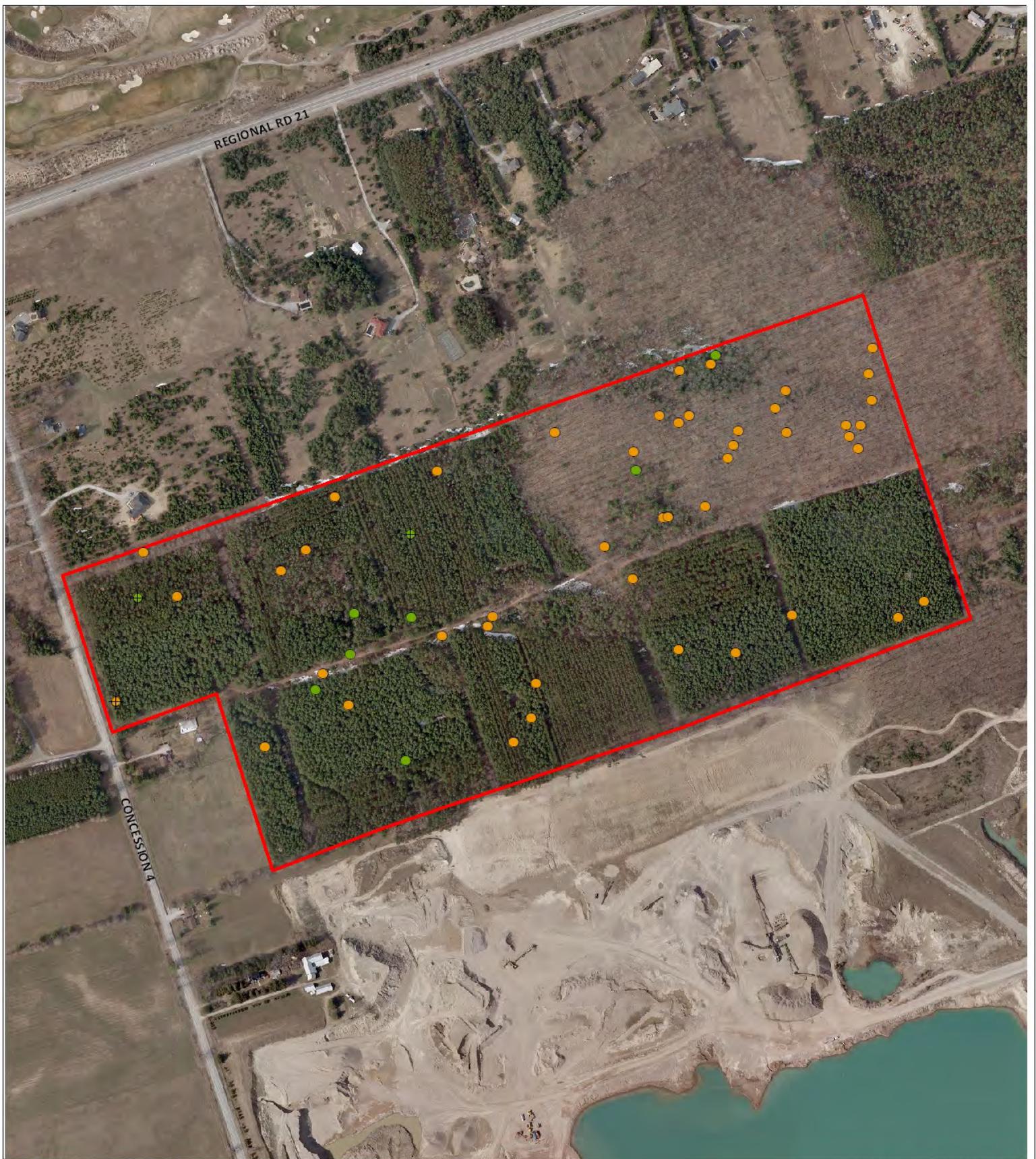
Legend

Vegetation Community Ranks

 L1	 L4
 L2	 L5
 L3	 L+

 Clubine Study Area Boundary

NOTE: All vegetation communities with their associated scores and ranks can be found in Appendix #1.



Date: November 2012
 Orthophoto: Spring 2008, First Base
 Solutions Inc.

Map 11: Location of Flora Species of Concern

Legend

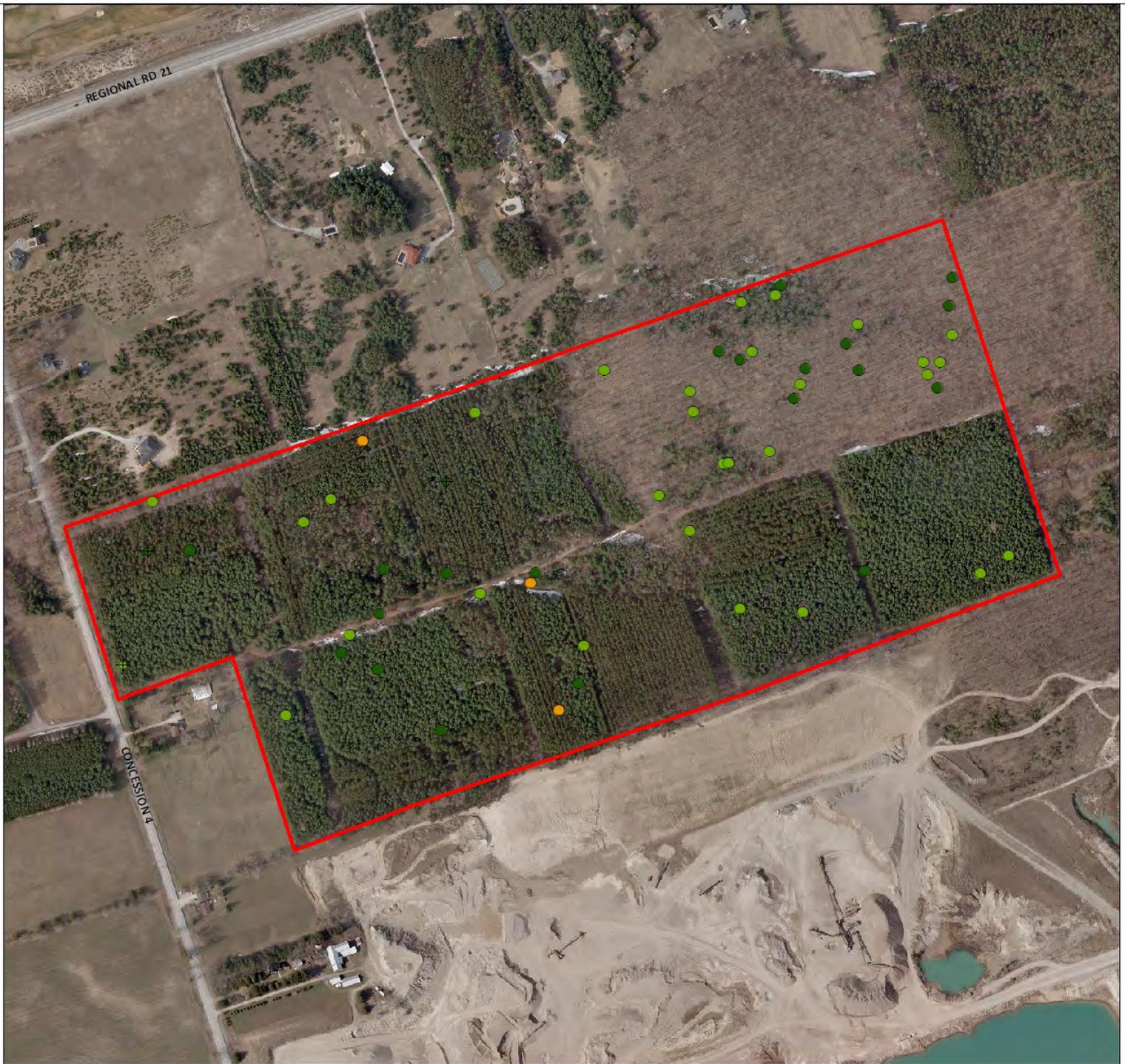
Flora Species of
 Concern (L1-L4)

- L1
- L2

Planted Flora Species
 of Concern (L1-L4)

- ⊕ L1
- ⊕ L2
- ⊕ L3
- ⊕ L4

Clubine Study Area Boundary

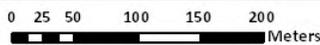
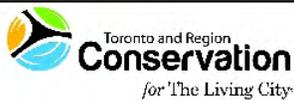


Flora Habitat Dependence Scores

- 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.



Date: November 2012
 Orthophoto: Spring 2008, First Base Solutions Inc.

**Map 12:
 Flora Species Habitat
 Dependence Scores**

Legend

- Clubine Study Area Boundary



0 25 50 100 150 200 Meters

Date: November 2012
 Orthophoto: Spring 2008, First Base
 Solutions Inc.

Map 13: Locations of Fauna Species of Concern

Legend

Fauna Species of Concern

- ▲ L1 ▲ L3
- ▲ L2

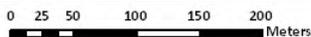
Clubine Study Area Boundary



Fauna 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

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



Date: November 2012
 Orthophoto: Spring 2008, First Base Solutions Inc.

**Map 14:
 Fauna Species
 Habitat Dependence
 Scores**

Legend

- Clubine Study Area Boundary
- △ Fauna Species
- Frog Species

Appendix 1: List of Vegetation Communities in the Clubine Tract Study Area (2011)

ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2010-04)
			Local Occur.	Geophy. Requir.	Total Score	
Forest						
FOD1-1	Dry-Fresh Red Oak Deciduous Forest	1.8	3.5	4.0	7.5	L2
FOM2-2	Dry-Fresh White Pine - Sugar Maple Mixed Forest	1.1	2.5	1.0	3.5	L4
FOM3-2	Dry-Fresh Hemlock - Sugar Maple Mixed Forest	1.0	2.5	2.0	4.5	L4
FOD5-5	Dry-Fresh Sugar Maple - Hickory Deciduous Forest	5.2	3.5	1.0	4.5	L4
CUP3-1	Red Pine Coniferous Plantation	3.6	1.5	0.0	1.5	L5
CUP3-2	White Pine Coniferous Plantation	12.0	1.5	0.0	1.5	L5
CUP3-H	Mixed Conifer Coniferous Plantation	8.8	1.5	0.0	1.5	L5
CUP3-3	Scotch Pine Coniferous Plantation	3.5	2.0	0.0	2.0	L+
Successional						
CUH1-A	Treed Hedgerow	0.8	1.5	0.0	1.5	L5

Appendix 2: List of Flora Species Found in the Clubine Tract Study Area (2011)

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)
<i>Chimaphila umbellata</i> ssp. <i>cisatlantica</i>	pipsissewa	4	4	5	5	18	L2
<i>Lycopodium dendroidium</i>	round-branched ground-pine	2	5	5	5	17	L2
<i>Pyrola asarifolia</i>	pink pyrola	3	4	5	5	17	L2
<i>Viburnum rafinesquianum</i>	downy arrow-wood	4	5	4	4	17	L2
<i>Adiantum pedatum</i>	northern maidenhair fern	2	3	5	5	15	L3
<i>Anemone acutiloba</i>	sharp-lobed hepatica	2	4	4	5	15	L3
<i>Anemone cylindrica</i>	long-fruited thimbleweed	3	4	3	4	14	L3
<i>Aquilegia canadensis</i>	wild columbine	2	4	3	5	14	L3
<i>Arabis glabra</i>	tower mustard	4	4	4	4	16	L3
<i>Calystegia spithamea</i> ssp. <i>spithamea</i>	low bindweed	4	4	4	4	16	L3
<i>Carex albursina</i>	white bear sedge	2	3	5	4	14	L3
<i>Carex eburnea</i>	bristle-leaved sedge	3	4	4	4	15	L3
<i>Carex hitchcockiana</i>	Hitchcock's sedge	3	3	5	3	14	L3
<i>Claytonia caroliniana</i>	broad-leaved spring beauty	2	4	5	5	16	L3
<i>Dicentra canadensis</i>	squirrel-corn	2	4	5	4	15	L3
<i>Dicentra cucullaria</i>	Dutchman's breeches	2	4	4	5	15	L3
<i>Dirca palustris</i>	leatherwood	3	4	5	4	16	L3
<i>Galium lanceolatum</i>	wild licorice	4	5	4	3	16	L3
<i>Juglans cinerea</i>	butternut	1	5	4	4	14	L3
<i>Lonicera canadensis</i>	fly honeysuckle	2	4	4	4	14	L3
<i>Lonicera dioica</i>	wild honeysuckle	3	4	4	4	15	L3
<i>Mitchella repens</i>	partridgeberry	2	4	4	5	15	L3
<i>Mitella diphylla</i>	mitrewort	2	3	4	5	14	L3
<i>Monotropa hypopithys</i>	pinetop	2	4	5	5	16	L3
<i>Monotropa uniflora</i>	Indian-pipe	2	4	5	5	16	L3
<i>Oryzopsis asperifolia</i>	white-fruited mountain-rice	2	4	4	5	15	L3
<i>Oryzopsis racemosa</i>	black-fruited mountain-rice	3	3	5	4	15	L3
<i>Pyrola elliptica</i>	shinleaf	2	4	4	4	14	L3
<i>Sporobolus cryptandrus</i>	sand dropseed	3	3	5	3	14	L3
<i>Streptopus roseus</i>	rose twisted-stalk	2	4	4	5	15	L3
<i>Trientalis borealis</i> ssp. <i>borealis</i>	star-flower	2	4	4	5	15	L3
<i>Uvularia grandiflora</i>	large-flowered bellwort	1	4	5	5	15	L3

Appendix 2: List of Flora Species Found in the Clubine Tract Study Area (2011)

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)
<i>Viburnum acerifolium</i>	maple-leaved viburnum	2	3	4	5	14	L3
<i>Acer rubrum</i>	red maple	2	4	1	5	12	L4
<i>Actaea pachypoda</i>	white baneberry	2	3	4	3	12	L4
<i>Allium tricoccum</i>	wild leek	1	3	4	4	12	L4
<i>Amelanchier cf x interior</i>	hybrid serviceberry complex	4	3	3	3	13	L4
<i>Apocynum androsaemifolium</i>	spreading dogbane	2	3	2	4	11	L4
<i>Betula alleghaniensis</i>	yellow birch	1	4	3	5	13	L4
<i>Betula papyrifera</i>	paper birch	1	4	2	4	11	L4
<i>Cardamine diphylla</i>	broad-leaved toothwort	2	3	4	4	13	L4
<i>Cardamine x maxima</i>	hybrid toothwort	3	3	3	3	12	L4
<i>Carex arctata</i>	nodding wood sedge	2	4	2	3	11	L4
<i>Carex deweyana</i>	Dewey's sedge	2	4	3	3	12	L4
<i>Carex pedunculata</i>	early-flowering sedge	2	3	3	3	11	L4
<i>Carex pensylvanica</i>	Pennsylvania sedge	2	4	3	4	13	L4
<i>Carex sprengelii</i>	long-beaked sedge	2	4	4	2	12	L4
<i>Carya cordiformis</i>	bitternut hickory	2	4	4	2	12	L4
<i>Caulophyllum giganteum</i>	long-styled blue cohosh	2	3	4	4	13	L4
<i>Cornus rugosa</i>	round-leaved dogwood	2	4	4	3	13	L4
<i>Corylus cornuta</i>	beaked hazel	2	4	3	4	13	L4
<i>Diervilla lonicera</i>	bush honeysuckle	2	3	2	4	11	L4
<i>Dryopteris intermedia</i>	evergreen wood fern	2	4	4	3	13	L4
<i>Dryopteris marginalis</i>	marginal wood fern	2	3	3	4	12	L4
<i>Elymus hystrix</i>	bottle-brush grass	2	3	4	3	12	L4
<i>Epifagus virginiana</i>	beech-drops	2	3	5	2	12	L4
<i>Fagus grandifolia</i>	American beech	1	4	3	4	12	L4
<i>Festuca subverticillata</i>	nodding fescue	3	2	4	3	12	L4
<i>Galium asprellum</i>	rough bedstraw	3	2	4	2	11	L4
<i>Maianthemum canadense</i>	Canada May-flower	1	4	1	5	11	L4
<i>Monarda fistulosa</i>	wild bergamot	3	3	2	3	11	L4
<i>Osmorhiza claytonii</i>	woolly sweet cicely	2	3	4	3	12	L4
<i>Physalis heterophylla</i>	clammy ground-cherry	3	2	3	3	11	L4
<i>Pinus strobus</i>	white pine	1	4	3	4	12	L4

Appendix 2: List of Flora Species Found in the Clubine Tract Study Area (2011)

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)
<i>Polygonatum pubescens</i>	downy Solomon's seal	2	4	2	5	13	L4
<i>Populus grandidentata</i>	large-toothed aspen	2	3	4	3	12	L4
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	heal-all (native)	4	2	3	2	11	L4
<i>Pteridium aquilinum</i> var. <i>latiusculum</i>	eastern bracken	2	4	2	4	12	L4
<i>Quercus rubra</i>	red oak	1	4	2	4	11	L4
<i>Schizachne purpurascens</i> ssp. <i>purpurascens</i>	purple melic grass	2	3	3	5	13	L4
<i>Smilax hispida</i>	bristly greenbrier	3	3	3	3	12	L4
<i>Thuja occidentalis</i>	white cedar	1	4	1	5	11	L4
<i>Tiarella cordifolia</i>	foam-flower	1	3	3	4	11	L4
<i>Trillium erectum</i>	red trillium	1	4	3	5	13	L4
<i>Trillium grandiflorum</i>	white trillium	1	3	4	5	13	L4
<i>Tsuga canadensis</i>	eastern hemlock	1	4	3	5	13	L4
<i>Waldsteinia fragarioides</i>	barren strawberry	2	4	4	3	13	L4
<i>Acer saccharum</i> ssp. <i>saccharum</i>	sugar maple	1	3	0	2	6	L5
<i>Achillea millefolium</i> ssp. <i>lanulosum</i>	woolly yarrow	2	2	0	1	5	L5
<i>Actaea rubra</i>	red baneberry	2	3	1	3	9	L5
<i>Ambrosia artemisiifolia</i>	common ragweed	2	1	3	0	6	L5
<i>Anemone virginiana</i>	common thimbleweed	2	3	0	3	8	L5
<i>Aralia nudicaulis</i>	wild sarsaparilla	2	3	1	4	10	L5
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	1	3	2	3	9	L5
<i>Asclepias syriaca</i>	common milkweed	2	2	0	2	6	L5
<i>Aster cordifolius</i>	heart-leaved aster	2	1	0	2	5	L5
<i>Athyrium filix-femina</i> var. <i>angustum</i>	northeastern lady fern	2	3	1	3	9	L5
<i>Carex rosea</i>	curly-styled sedge	2	2	3	2	9	L5
<i>Circaea lutetiana</i> ssp. <i>canadensis</i>	enchanter's nightshade	2	1	1	1	5	L5
<i>Clinopodium vulgare</i>	wild basil	3	3	1	3	10	L5
<i>Conyza canadensis</i>	horse-weed	3	1	2	0	6	L5
<i>Cornus alternifolia</i>	alternate-leaved dogwood	2	2	1	2	7	L5
<i>Cornus foemina</i> ssp. <i>racemosa</i>	grey dogwood	2	2	4	2	10	L5
<i>Desmodium canadense</i>	showy tick-trefoil	2	2	3	3	10	L5
<i>Dryopteris carthusiana</i>	spinulose wood fern	2	3	2	2	9	L5
<i>Echinocystis lobata</i>	wild cucumber	2	2	3	1	8	L5

Appendix 2: List of Flora Species Found in the Clubine Tract Study Area (2011)

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)
<i>Equisetum arvense</i>	field horsetail	1	2	1	1	5	L5
<i>Erigeron annuus</i>	daisy fleabane	2	2	0	1	5	L5
<i>Erythronium americanum</i> ssp. <i>americanum</i>	yellow trout-lily	2	3	3	2	10	L5
<i>Fragaria vesca</i> ssp. <i>americana</i>	woodland strawberry	3	2	2	2	9	L5
<i>Fraxinus americana</i>	white ash	1	2	0	3	6	L5
<i>Galium triflorum</i>	sweet-scented bedstraw	2	2	2	2	8	L5
<i>Hackelia virginiana</i>	Virginia stickseed	2	2	0	2	6	L5
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	2	2	1	2	7	L5
<i>Maianthemum racemosum</i> ssp. <i>racemosum</i>	false Solomon's seal	2	3	2	3	10	L5
<i>Maianthemum stellatum</i>	starry false Solomon's seal	2	2	1	3	8	L5
<i>Oenothera biennis</i>	common evening-primrose	2	1	1	1	5	L5
<i>Ostrya virginiana</i>	ironwood	2	3	2	2	9	L5
<i>Oxalis stricta</i>	common yellow wood-sorrel	3	1	1	1	6	L5
<i>Plantago rugelii</i>	red-stemmed plantain	2	2	0	1	5	L5
<i>Populus tremuloides</i>	trembling aspen	1	3	1	3	8	L5
<i>Prenanthes altissima</i>	tall wood lettuce	2	3	2	2	9	L5
<i>Prunus serotina</i>	black cherry	2	2	0	2	6	L5
<i>Prunus virginiana</i> ssp. <i>virginiana</i>	choke cherry	1	2	0	1	4	L5
<i>Ranunculus abortivus</i>	kidney-leaved buttercup	2	3	1	2	8	L5
<i>Rhus radicans</i> ssp. <i>rydbergii</i>	poison ivy (shrub form)	2	2	0	2	6	L5
<i>Ribes cynosbati</i>	prickly gooseberry	2	3	2	2	9	L5
<i>Rubus allegheniensis</i>	common blackberry	2	3	0	1	6	L5
<i>Rubus idaeus</i> ssp. <i>melanolasius</i>	wild red raspberry	1	1	0	1	3	L5
<i>Rubus occidentalis</i>	wild black raspberry	2	1	0	1	4	L5
<i>Rubus odoratus</i>	purple-flowering raspberry	2	2	2	2	8	L5
<i>Sambucus racemosa</i> ssp. <i>pubens</i>	red-berried elder	2	3	2	2	9	L5
<i>Sanguinaria canadensis</i>	bloodroot	2	3	0	3	8	L5
<i>Smilax herbacea</i>	carrion-flower	3	3	2	2	10	L5
<i>Solidago altissima</i>	tall goldenrod	1	2	0	0	3	L5
<i>Solidago flexicaulis</i>	zig-zag goldenrod	2	1	3	2	8	L5
<i>Thalictrum dioicum</i>	early meadow rue	2	3	3	2	10	L5
<i>Tilia americana</i>	basswood	1	4	2	3	10	L5

Appendix 2: List of Flora Species Found in the Clubine Tract Study Area (2011)

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)
<i>Ulmus americana</i>	white elm	1	4	0	2	7	L5
<i>Urtica dioica</i> ssp. <i>gracilis</i>	American stinging nettle	2	3	2	2	9	L5
<i>Viola pubescens</i>	stemmed yellow violet	2	3	1	2	8	L5
<i>Vitis riparia</i>	riverbank grape	1	1	0	0	2	L5
<i>Alliaria petiolata</i>	garlic mustard	2				2	L+
<i>Berberis thunbergii</i>	Japanese barberry	4				4	L+
<i>Bromus inermis</i> ssp. <i>inermis</i>	smooth brome grass	3				3	L+
<i>Campanula rapunculoides</i>	creeping bellflower	3				3	L+
<i>Chrysanthemum leucanthemum</i>	ox-eye daisy	3				3	L+
<i>Cynanchum rossicum</i>	dog-strangling vine	3				3	L+
<i>Dactylis glomerata</i>	orchard grass	3				3	L+
<i>Daphne mezereum</i>	daphne	5				5	L+
<i>Daucus carota</i>	Queen Anne's lace	3				3	L+
<i>Dianthus armeria</i>	Deptford pink	4				4	L+
<i>Echium vulgare</i>	viper's bugloss	4				4	L+
<i>Elymus repens</i>	quack grass	3				3	L+
<i>Festuca pratensis</i>	meadow fescue	3				3	L+
<i>Geum urbanum</i>	urban avens	3				3	L+
<i>Glechoma hederacea</i>	creeping Charlie	3				3	L+
<i>Hesperis matronalis</i>	dame's rocket	2				2	L+
<i>Hieracium caespitosum</i> ssp. <i>caespitosum</i>	yellow hawkweed	3				3	L+
<i>Hieracium piloselloides</i>	smooth yellow hawkweed	3				3	L+
<i>Hypericum perforatum</i>	common St. Johnswort	3				3	L+
<i>Leonurus cardiaca</i> ssp. <i>cardiaca</i>	motherwort	3				3	L+
<i>Linaria vulgaris</i>	butter-and-eggs	3				3	L+
<i>Lithospermum officinale</i>	Eurasian gromwell	4				4	L+
<i>Lonicera x bella</i>	shrub honeysuckle	3				3	L+
<i>Melilotus alba</i>	white sweet clover	3				3	L+
<i>Mycelis muralis</i>	wall lettuce	5				5	L+
<i>Nepeta cataria</i>	catnip	3				3	L+
<i>Phleum pratense</i>	Timothy grass	3				3	L+
<i>Plantago lanceolata</i>	English plantain	4				4	L+

Appendix 2: List of Flora Species Found in the Clubine Tract Study Area (2011)

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)
<i>Poa compressa</i>	flat-stemmed blue grass	3				3	L+
<i>Poa nemoralis</i>	woodland spear grass	4				4	L+
<i>Poa pratensis ssp. pratensis</i>	Kentucky blue grass	3				3	L+
<i>Potentilla recta</i>	sulphur cinquefoil	3				3	L+
<i>Rhamnus cathartica</i>	common buckthorn	2				2	L+
<i>Saponaria officinalis</i>	bouncing Bet	4				4	L+
<i>Solanum dulcamara</i>	bittersweet nightshade	3				3	L+
<i>Sorbus aucuparia</i>	European mountain-ash	3				3	L+
<i>Syringa vulgaris</i>	common lilac	3				3	L+
<i>Taraxacum officinale</i>	dandelion	3				3	L+
<i>Trifolium pratense</i>	red clover	3				3	L+
<i>Verbascum thapsus</i>	common mullein	3				3	L+
<i>Veronica officinalis</i>	common speedwell	3				3	L+
<i>Viburnum lantana</i>	wayfaring tree	4				4	L+
<i>Viburnum opulus</i>	European highbush cranberry	3				3	L+
<i>Vicia cracca</i>	cow vetch	3				3	L+
<i>Acer negundo</i>	Manitoba maple	2	0	0	2	4	L+?
<i>Geranium robertianum</i>	herb Robert	3				3	L+?
<i>Pinus resinosa</i>	red pine	2	5	5	5	17	pL2
<i>Picea glauca</i>	white spruce	1	5	4	4	14	pL3
<i>Picea abies</i>	Norway spruce	5				5	pL+
<i>Pinus banksiana</i>	Jack pine	5				5	pL+
<i>Pinus sylvestris</i>	Scots pine	3				3	pL+

Appendix 3: List of Breeding Fauna at Clubine Tract.

Common Name	Code	Scientific Name	count	LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank
Survey Species: species for which the TRCA protocol effectively surveys.													
Birds													
brown creeper	BRCR	<i>Certhia americana</i>	1	1	2	2	3	2	2	4	0	16	L3
mourning warbler	MOWA	<i>Geothlypis philadelphia</i>	(2000)	0	3	2	2	2	2	4	0	15	L3
ovenbird	OVEN	<i>Seiurus aurocapillus</i>	9	0	2	3	4	2	4	4	0	19	L3
pine warbler	PIWA	<i>Setophaga pinus</i>	4	0	2	2	4	1	3	3	0	15	L3
yellow-rumped warbler	YRWA	<i>Setophaga coronata</i>	3	3	1	2	3	1	2	4	0	16	L3
eastern wood-pewee	EAWP	<i>Contopus virens</i>	x	0	4	2	2	1	1	3	0	13	L4
great-crested flycatcher	GCFL	<i>Myiarchus crinitus</i>	x	0	2	2	3	1	2	2	0	12	L4
grey catbird	GRCA	<i>Dumetella carolinensis</i>	x	0	2	2	1	1	1	3	0	10	L4
hairy woodpecker	HAWO	<i>Picoides villosus</i>	x	0	2	2	3	1	2	2	0	12	L4
indigo bunting	INBU	<i>Passerina cyanea</i>	x	0	2	2	1	1	2	4	0	12	L4
northern flicker	NOFL	<i>Colaptes auratus</i>	x	0	3	2	1	1	2	3	0	12	L4
red-breasted nuthatch	RBNU	<i>Sitta canadensis</i>	x	0	1	2	3	1	1	2	0	10	L4
red-eyed vireo	REVI	<i>Vireo olivaceus</i>	x	0	2	2	2	1	1	3	0	11	L4
ruby-throated hummingbird	RTHU	<i>Archilochus colubris</i>	x	0	2	2	1	1	2	2	0	10	L4
American Crow	AMCR	<i>Corvus brachyrhynchos</i>	x	0	1	2	1	1	0	0	0	5	L5
American goldfinch	AMGO	<i>Carduelis tristis</i>	x	0	2	2	1	1	0	1	0	7	L5
American robin	AMRO	<i>Turdus migratorius</i>	x	0	1	2	1	1	0	1	0	6	L5
black-capped chickadee	BCCH	<i>Parus atricapillus</i>	x	0	1	2	1	1	0	1	0	6	L5
blue jay	BLJA	<i>Cyanocitta cristata</i>	x	0	4	2	1	1	0	1	0	9	L5
brown-headed cowbird	BHCO	<i>Molothrus ater</i>	x	0	2	2	1	1	0	1	0	7	L5
cedar waxwing	CEDW	<i>Bombycilla cedrorum</i>	x	0	1	2	1	1	0	1	0	6	L5
chipping sparrow	CHSP	<i>Spizella passerina</i>	x	0	2	2	1	1	0	2	0	8	L5
downy woodpecker	DOWO	<i>Picoides pubescens</i>	x	0	3	2	1	1	1	1	0	9	L5
northern cardinal	NOCA	<i>Cardinalis cardinalis</i>	x	0	2	2	1	1	1	2	0	9	L5
red-winged blackbird	RWBL	<i>Agelaius phoeniceus</i>	x	0	2	2	1	1	0	2	0	8	L5
song sparrow	SOSP	<i>Melospiza melodia</i>	x	0	2	2	1	2	0	2	0	9	L5
yellow warbler	YWAR	<i>Setophaga petechia</i>	x	0	1	2	1	1	1	3	0	9	L5
Herpetofauna													
American toad	AMTO	<i>Anaxyrus americanus</i>	x	0	3	2	1	4	0	4	0	14	L4

Appendix 3: List of Breeding Fauna at Clubine Tract.

Common Name	Code	Scientific Name	count	LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank
Incidental Species: species that are reported on as incidental to the TRCA protocol.													
Mammals													
hairy-tailed mole	HTMO	<i>Parascalops breweri</i>	1	4	2	2	1	4	1	4	0	18	L3
eastern chipmunk	EACH	<i>Tamias striatus</i>	x	0	2	2	2	3	1	3	0	13	L4
red squirrel	RESQ	<i>Tamiasciurus hudsonicus</i>	x	0	2	2	1	3	1	2	0	11	L4
coyote	COYO	<i>Canis latrans</i>	x	0	2	2	1	3	0	1	0	9	L5
grey squirrel	GRSQ	<i>Sciurus carolinensis</i>	x	0	2	2	1	3	0	0	0	8	L5
LEGEND													
LO = local occurrence			PIS = Patch Isolation Sensitivity						LX = extirpated				
PTn = population trend, continent-wide			STD = sensitivity to development						L+ = non-native/introduced				
PTt = population trend, TRCA			+ = additional points										
HD = habitat dependence			TS = total score										
AS = area sensitivity			L-rank = TRCA Rank, October, 2008										