

PE28.1
Attachment 1



WILD, CONNECTED AND DIVERSE

**THE DRAFT BIODIVERSITY STRATEGY
FOR TORONTO**



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Wild, Connected and Diverse: the Draft Biodiversity Strategy for Toronto

**“Where you have native species, you have biodiversity,
where you have biodiversity you have health.”**

Diana Beresford-Kroeger ‘Call of the Forest’

Toronto is North America’s fourth largest city. With a population of 2.9 million people and expected to increase to 3.4 million by 2041, it is relatively dense and continues to grow at a rapid pace. It also is

incredibly fortunate to enjoy a strong connection to nature, located on the north shore of Lake Ontario and deeply incised by six major river systems and associated naturalized ravines, including the Rouge National Urban Park (Canada’s first national urban park). These systems are part of and connect Toronto to a larger bioregion that includes the Lake Ontario basin and the Oak Ridges Moraine. The City is located on the migratory pathway of many species including song birds, butterflies and spawning salmon.

Nature is an important part of the city – and part of Toronto’s appeal as a liveable city. Nature, in its many forms, from ravine forests and river mouth wetlands to backyards, street trees and pollinator gardens contributes to our well-being. It helps clean air and water, absorb storm water, as well as provide opportunities for recreation and spiritual connection. A healthy natural system requires a diversity of plants, animals, and microbes at genetic, species, and community levels. Biodiversity needs to be thriving in current conditions and should be resilient to future changes in land and climate.

The draft Biodiversity Strategy builds on the concept of healthy nature and utilizes the work of the many volunteers in the Biodiversity Series as well as up-to-date information from the state of science and practice to propose actions that the city and the community can undertake to ensure that nature in Toronto will flourish.

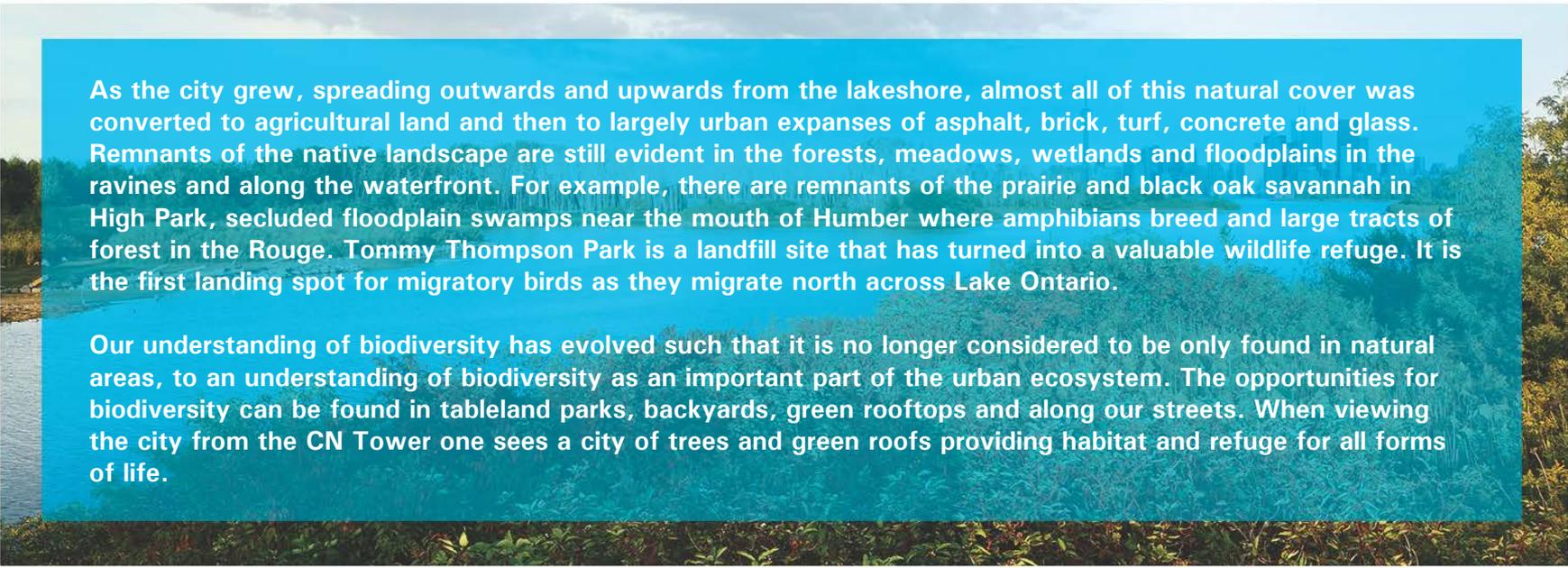
Toronto’s interest in Biodiversity is also part of a larger global initiative focused on prioritizing biodiversity conservation in cities. ‘Cities and Biodiversity Outlook’ is a global analysis of how urban land expansion will impact biodiversity and ecosystems stemming from the 2010 UN Convention on Biological Diversity (see Appendix B).

Torontonians are engaged with nature and enjoy the many natural parklands. They are also passionate and invest many volunteer hours - like the volunteers who work tirelessly to restore and monitor natural areas such as the Todmorden Mill Wildflower Preserve in the lower Don Valley, or the more than 100 scientists, artists and academics who contributed to Toronto’s Biodiversity series. A series of booklets that chronicles the amazing cross section of plants and animals that live in Toronto: birds, butterflies, bees, spiders, mammals, trees and shrubs, mushrooms, reptiles and amphibians and fishes (see Engage Success story on page 31).

Historic Perspective

Before European settlement, the landscape of Toronto was dominated by upland hardwood and mixed forest of Carolinian and Great Lakes–St. Lawrence character. Low-lying wet areas were covered by forest and shrub swamps, with marshes and meadows along rivers and the lake. There were extensive wetlands at the mouths of the Don, Humber and Rouge rivers. Dry sites on sandy soils featured rich prairies and oak savannahs. This landscape provided habitat and refuge for an extremely rich diversity of species.





As the city grew, spreading outwards and upwards from the lakeshore, almost all of this natural cover was converted to agricultural land and then to largely urban expanses of asphalt, brick, turf, concrete and glass. Remnants of the native landscape are still evident in the forests, meadows, wetlands and floodplains in the ravines and along the waterfront. For example, there are remnants of the prairie and black oak savannah in High Park, secluded floodplain swamps near the mouth of Humber where amphibians breed and large tracts of forest in the Rouge. Tommy Thompson Park is a landfill site that has turned into a valuable wildlife refuge. It is the first landing spot for migratory birds as they migrate north across Lake Ontario.

Our understanding of biodiversity has evolved such that it is no longer considered to be only found in natural areas, to an understanding of biodiversity as an important part of the urban ecosystem. The opportunities for biodiversity can be found in tableland parks, backyards, green rooftops and along our streets. When viewing the city from the CN Tower one sees a city of trees and green roofs providing habitat and refuge for all forms of life.

What is Biodiversity?

“Biodiversity” - the wondrous, teeming, calamitously threatened variety & variability of life on Earth, sometimes measured by “species richness.” Robert Macfarlane (Word of the Day, March 16, 2018)

The United Nations’ Environment Programme (UNEP) defines biodiversity as a combination of “bio” (life) and “diversity”, generally referring to the variety and variability of life on Earth. Biodiversity typically measures variation at the genetic, the species, and the ecosystem level. In the urban context, biodiversity refers to the variety and richness of living organisms as well as habitat diversity found in and on the edge of human settlements (Muller, 2010).

Biodiversity can be visualized as an interconnected web of life – the variability among living organisms from all sources, including terrestrial and aquatic ecosystems. Biodiversity includes diversity within and between species and of ecosystems.

Why is Biodiversity Important?

“After all, our own health and ultimately our very survival is linked to the species and natural spaces that share the planet with us. Without plants, there would be no oxygen; without the life of the soil, there would be no plants; without unpolluted water, we would die.” Margaret Atwood and Graeme Gibson, Biodiversity Series, 2011

Our health, well-being, and economic progress depend on healthy, diverse nature. The diversity of an ecosystem helps to keep it robust and resilient to future stresses. Clean water and air are essential to our health and quality of life. We depend on a healthy forest cover and wetlands to manage stormwater flows and help clean water. Forests help regulate climate and mitigate against climate change by absorbing solar radiation and acting as carbon sinks. A healthy forest also supports oxygen production and air purification. Biodiversity also contributes to our resilience as a city by helping in the recovery from destructive invasive pests like the Emerald Ash Borer and is important for pollination of flowers that enable plants to produce seeds and fruits that animals need to survive. The sound of song birds in the spring, watching a salmon struggle upstream or chasing a monarch butterfly as it finds its way along the shoreline on its fall migration south are experiences that enrich our lives.

The question is how can we design our city to protect and enhance nature and the biodiversity found within it?

What is the Purpose of the Biodiversity Strategy?

Toronto’s first Biodiversity Strategy (the Strategy) aims to increase the quality and quantity of natural habitat within the City in order to support healthier, more robust biodiversity and increase access to and awareness of nature. The Strategy is intended to position Toronto as one of the leaders in conserving urban biodiversity.

The draft Strategy was developed in collaboration with the Parks Forestry and Recreation Division, the Environment and Energy Division and the Toronto and Region Conservation Authority (TRCA). Input to the Strategy has also been received through work on the Biodiversity Series and the May 2017 former Chief Planner Roundtable on Biodiversity from the Royal Ontario Museum (ROM), universities, environmental groups, biodiversity experts and amateur scientists.

BIODIVERSITY IN TORONTO

'[Nature in the City] is the consequence of a complex interaction between the multiple purposes and activities of human beings and other living creatures and of the natural processes that govern the transfer of energy, the movement of air, the erosion of the earth and the hydrologic cycle. The city is part of nature.' Anne Whiston Spirn, *The Granite Garden*

Urban areas can successfully support high biodiversity if they include relics of natural habitat such as forest, ravines or rivers. Cities originally established at ecosystem junctions such as the mouth of a river on a lake, as in Toronto's case, are usually areas high in biodiversity.

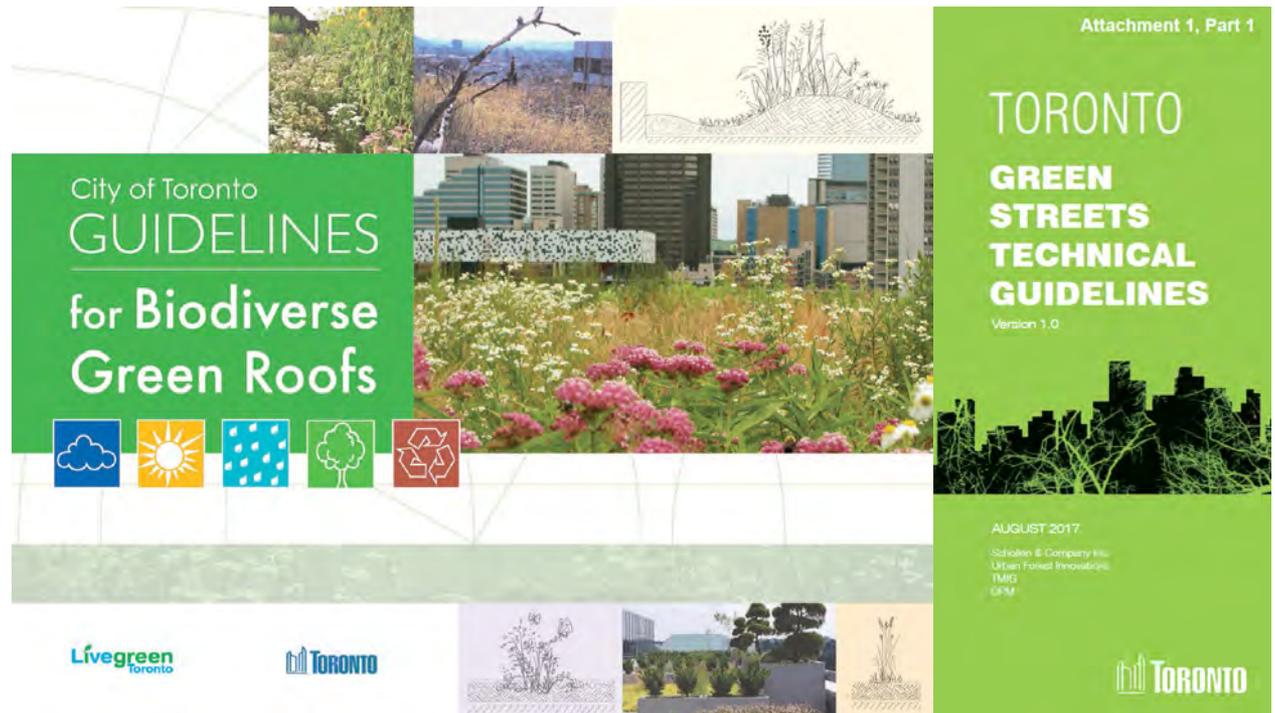
Toronto's Natural Heritage System consists of almost 11,000 ha (17% of the City's total land area) and includes rivers, ravines, forests, meadows and wetlands and Lake Ontario shoreline. The natural heritage system includes lands identified as environmentally significant and much of the City's robust biodiversity can be found in the 86 sites identified as Environmentally Significant Areas (ESAs). The ESAs collectively contain over 1049 species of plants (including 369 significant plant species), at least 175 species of birds (including 128 species confirmed to be breeding), many species of insects including migrating monarchs and many other species of butterflies, as well as a variety of reptiles and amphibians and numerous mammals. Several of these areas are provincially significant. A number of them are located on lands which are part of the Rouge Urban National Park (see Map 1, Habitat Supporting Biodiversity, page 8).

The Natural Heritage System and the ESA's are protected by policies in the Official Plan. Recently completed Plans for the Port Lands and the Downtown and emerging Secondary Plans such as Don Mills Crossing encourage new development to incorporate biodiversity through creating habitats, planting a variety of species that are pollinator friendly, and designing green roofs to be more biodiverse. The Official Plan is implemented through the development review process and tools such as the Ravine and Natural Features Protection Bylaw (administered by Parks, Forestry and Recreation) which protects the forested areas by requiring a permit for destruction of trees and requirements under the Toronto Green Standard which requires new development to treat glass to protect migratory birds; to plant only native species when adjacent to the natural heritage system (50% native everywhere else); and not permitting the planting of any invasive species. Further, the Toronto and Region Conservation Authority (TRCA) Fill Regulation protects valley and stream corridors by prohibiting certain activities unless a permit has been issued. (see Appendix A: Policies and Governance).

Other tools to encourage biodiversity include Guidelines for Biodiverse Green Roofs, Green Streets Technical Guidelines and Guidelines for Greening Surface Parking lots.

Design best practice:

Technical Guidelines for Green Streets provides vegetation selection tool which identifies context appropriate plant material selected for its aesthetic quality and habitat value, and for its tolerance of drought and urban conditions.



To better understand how to ensure biodiversity can thrive in the City, we need to understand the interactions of humans, other living creatures, plants and the natural processes that compose and shape the natural environment.

One of the planning challenges in protecting and enhancing biodiversity is that it is an inherently broad and complex subject. To better understand the complexity and inter-relations, biodiversity can be organized into the following 4 general categories, from broad to specific: habitat; ecosystem functions and services; taxa; and species.

Habitat

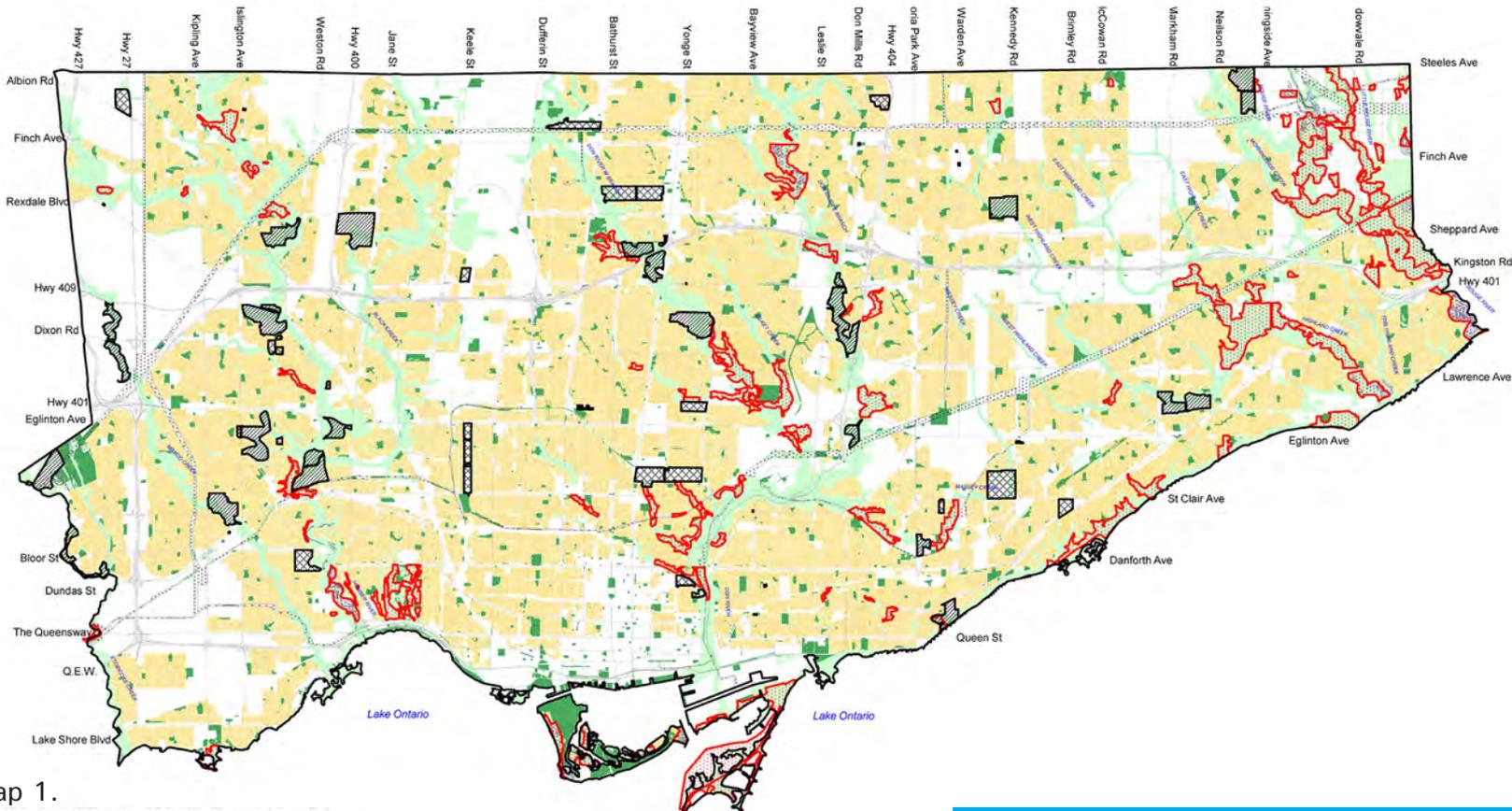
Habitat is the place where an animal or plant lives and can find food, shelter, refuge and can reproduce. Healthy habitat is key to healthy biodiversity. The City can be viewed as an interconnected system of habitats, from the very large to the very small. This system of interconnected habitats can be broken down into four categories or structural layers (below), with different functions and sizes that range from the landscape scale to specific sites. An effective approach to support biodiversity can be to link high quality habitat in major natural systems with other parks and open spaces, green corridors (liminal linkages) and 'stepping stones' (nodes and patches). Both aquatic and terrestrial habitats are included within the structural layers. Understanding landscape ecological processes suggest variations in patch size has a direct influence on species diversity, therefore it is important to enhance all habitat types.

Major Natural Systems:

The highest biodiversity in Toronto occurs within the Natural Heritage System (Map 1) which includes the city's significant natural heritage features and functions including habitats such as forest, wetlands, meadows, beaches and bluffs that provide shelter, food sources, and breeding areas for hundreds of species of plants and animals. The natural heritage system also supports the city's 86 ESAs which are primarily located within valleys, ravines and along the waterfront – areas which also function as important migration corridors through the city and beyond our boundaries. Habitat size is important. Relatively large areas of natural habitat are particularly important because they contain, or have the potential to contain, high quality habitats such as interior forest which are fundamental to preserving and enhancing native biodiversity such as Carolinian forest species. Examples of relatively large tracts of high quality habitat are found in the Rouge Valley, Tommy Thompson Park, High Park, Toronto Islands and Lambton Park Prairie.

Parks & Open Space:

Cemeteries, golf courses and large public parks are also significant but, as they are smaller and more manicured, provide less function than the Major Natural Systems. Nevertheless, they still provide key opportunities for biodiversity with mature trees and shrubs, and sometimes small ponds. Examples in Toronto include Mount Pleasant Cemetery, Centennial Park, Downsview Park and golf courses.



Map 1.
Potential Habitat Supporting Biodiversity

Natural Heritage System	Provincially Significant Wetlands
Neighbourhoods	ESAs
Parks & Open Spaces	
Golf Courses	
Cemeteries	

Not to Scale

About 11,000 ha or 17% of our land area (64,100 ha) is in the ravine/natural heritage system. A total of 2,698 ha or about 4% of the city's land area is identified as environmentally significant (equivalent to 19 High Parks).

Habitat (Cont'd)

Liminal Linkages:

'Liminal linkage' refers to a transition between two states or situations in a landscape or ecosystem. Liminal linkages or green corridors can provide a system of biodiversity connections within the urban fabric. This network of living green infrastructure elements offers an interconnected system of natural areas and linear spaces that perform ecosystem functions and support species movement. Liminal linkages that enhance connectivity within the City include major green streets; naturalized storm water infrastructure; utility corridors; and other linear systems, such as multi-use trail corridors. An excellent example is Meadoway Park connecting the Don River Valley to the Rouge National Urban Park along the Gatineau hydro corridor.

Nodes and Patches:

At a smaller scale, local parks, parkettes, courtyards, naturalized private outdoor spaces, privately-owned backyards and even green roofs can form "habitat islands". Node and patch areas can support smaller or less diverse populations of animals and plants and play an important role in increasing the overall connectivity of the network by providing stepping stones between larger natural areas, parks and opens spaces.

Ecosystem Functions and Services

"Ecosystem functions" occur when a healthy habitat type is working normally. If that function provides a benefit to humans, that benefit can be called an "ecosystem service".

Different types of habitat function in different ways. For instance, a woodland habitat slows the passage of rainwater through it during rainstorms by the natural function of vegetation absorbing the water. This results in reduced run-off along stream banks within that woodland. Reduced run-off along those stream banks results in erosion control, which is an "ecosystem service" that humans benefit from because of how the habitat is functioning.

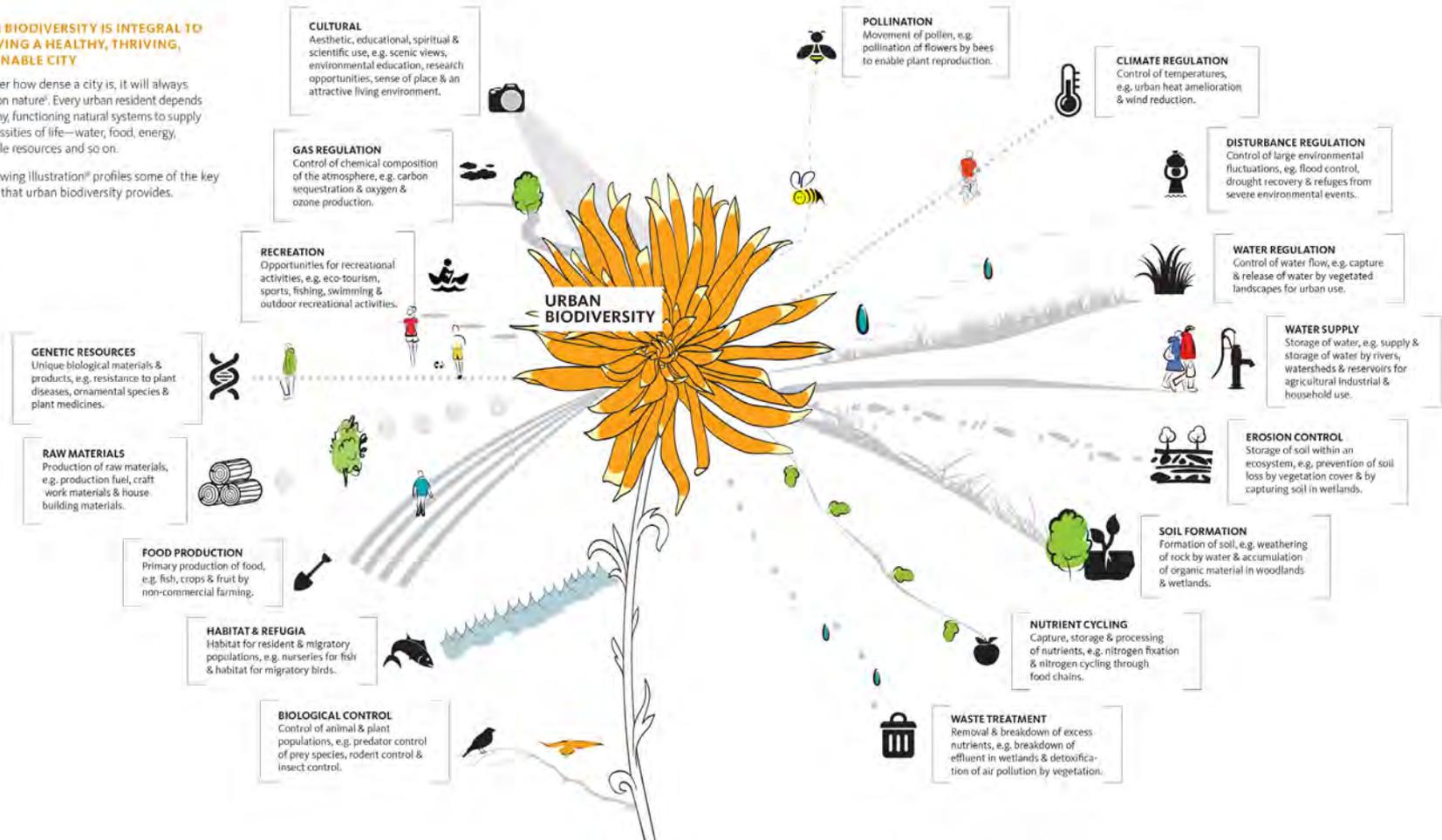
Healthy biodiversity within an urban area produces several key benefits that urban residents enjoy. The illustration (on page 10) illustrates some of the key benefits that urban biodiversity provides.

KEY BENEFITS THAT URBAN BIODIVERSITY PROVIDES

URBAN BIODIVERSITY IS INTEGRAL TO ACHIEVING A HEALTHY, THRIVING, SUSTAINABLE CITY

No matter how dense a city is, it will always depend on nature¹. Every urban resident depends on healthy, functioning natural systems to supply the necessities of life—water, food, energy, renewable resources and so on.

The following illustration² profiles some of the key benefits that urban biodiversity provides.



Source: ICLEI Canada

Taxa

“Taxa” are taxonomic groups of species. These groups utilize one or more of the types of habitat found within the city and may also provide one or more of the ecosystem functions and services listed above. For example birds utilize several of the types of habitat described above and contribute to functions and services such as seed dispersal, pollination, biological control of pests and cultural benefits.

Toronto has a rich biodiversity that the Biodiversity Series, which is organized by taxa, communicates as illustrated in the diagram (on page 12).

Species

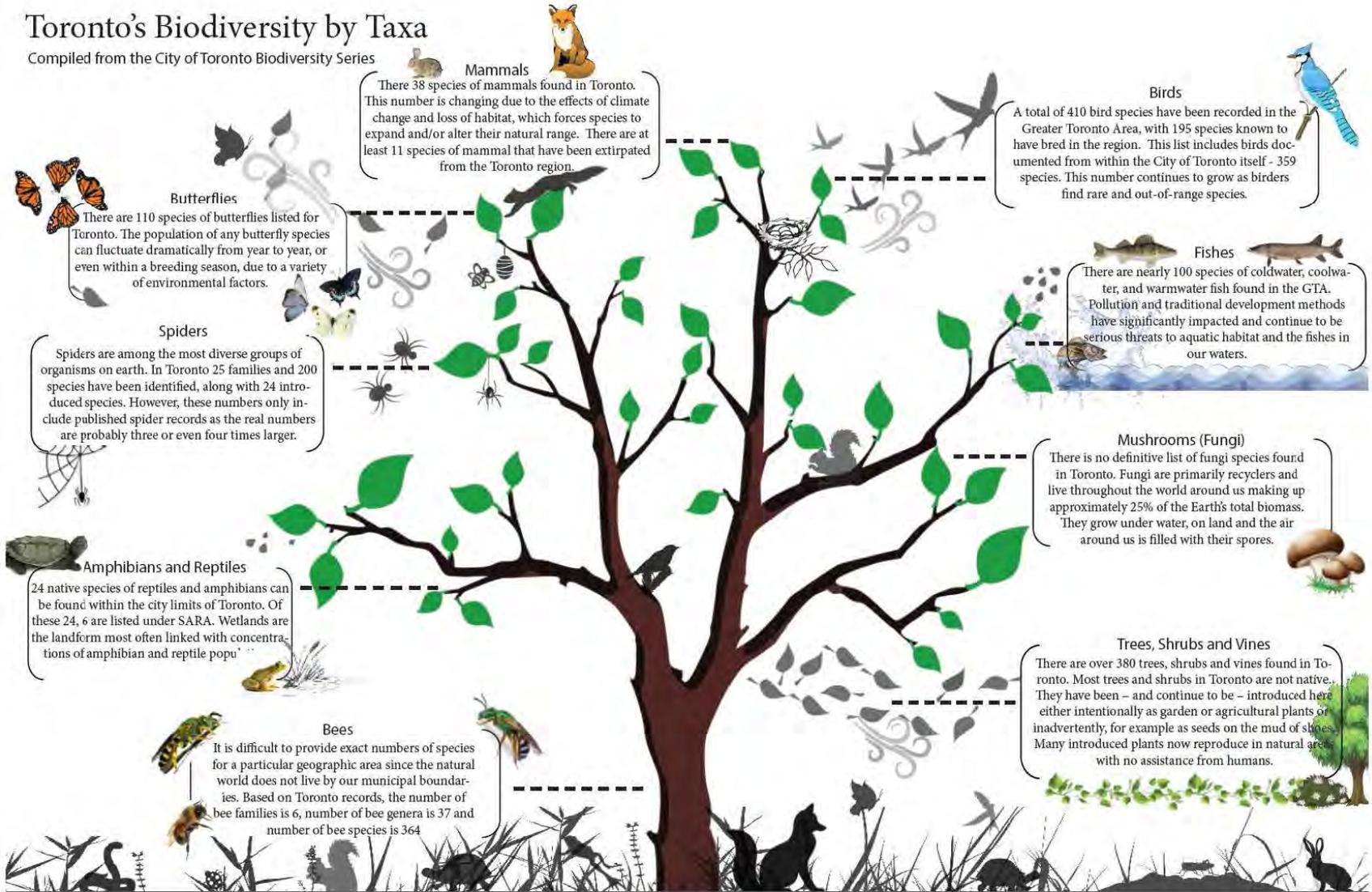
Toronto has a surprising variety of plant and animal species. According to the City’s Biodiversity Series the following have been found in the Toronto area:

- 380 species of trees, shrubs and vines;
- 404 species of birds;
- 110 species of butterflies;
- 92 species of fish;
- 38 species of mammals;
- 364 species of bees;
- 200 species of spiders; and
- 24 species of reptiles and amphibians.

Many of these species make their home in major natural systems found along the shoreline and in the valleys and ravines that criss-cross Toronto but a surprising number can also be found in parks, hydro corridors and backyards. The list includes both common and uncommon or rare species. Both are important to Toronto’s biodiversity. Common native species are the foundation of our local biodiversity and need to be supported following the notion that “keeping common species common” will help maintain our native species that are not yet threatened. Unfortunately, some local species are under pressure in terms of their habitat and life-cycle needs. Many of these are found within the 86 ESAs that have been identified and protected throughout the city.

Toronto's Biodiversity by Taxa

Compiled from the City of Toronto Biodiversity Series



A number of non-native terrestrial and aquatic “invasive species” have been introduced to our region and negatively impact our native biodiversity by out-competing it. These will be discussed in more detail under ‘Loss due to invasive species’ on page 19.

Species at Risk

“Species at Risk” are identified under the federal Species at Risk Act (SARA) 2002 as wildlife species that are extirpated, endangered, or threatened as a result of human activity. The purpose of the SARA is to provide for the recovery of and to manage species of special concern to prevent them from becoming endangered or threatened. Species at Risk includes “extirpated” species that no longer exist in the wild in an area, but are still known to occur elsewhere.

The TRCA has compiled a list of ‘Species of Regional Conservation Concern’, which includes species categorized under SARA and identified on the Species At Risk in Ontario (SARO) list (found in the provincial Endangered Species Act, 2007).

However, the TRCA list of Species of Regional Concern does not necessarily correspond to federal or provincial species at risk (SAR). For example, barn swallows are a SAR, but not a TRCA Species of Regional Concern. The TRCA lists species considered to be of regional conservation concern within their jurisdiction. They may not be currently rare, but are highly sensitive to habitat loss and disturbances associated with changes in the surrounding habitat. This list is regularly updated as conditions evolve due to fluctuating environmental factors such as climate change. Some examples in Toronto include the monarch butterfly; the rusty-patched bumble bee; Blanding’s turtle; birds such as the barn swallow, chimney swift, eastern meadowlark; and fish such as the redbside dace.

Examples of extirpated species, species that used to be found in Toronto include the river otter, Eastern Ribbonsnake, Western Chorus Frog, and the Karner Blue butterfly.





Species At Risk: Chimney Swift

Every spring during migration, tiny chimney swifts (*Chaetura pelagic*) dart about the sky above Toronto neighbourhoods, catching insects on the wing. At dusk, the swifts begin to congregate around large, abandoned industrial chimneys that used to dominate the Toronto skyline. In just moments, in a spectacular show, hundreds of swifts suddenly funnel down into their communal roosts. Some chimneys are home to thousands of individuals.

When it comes time to start nesting, the swifts break up into pairs and find other, smaller chimneys throughout the city. Once they have successfully raised young, the families again begin to congregate, once again using the large communal roosts in preparation to fly south for fall migration. We don't often think of cities as habitat for wildlife, but this species relies exclusively on chimneys for its survival.

Unfortunately, the number of suitable roosting and nesting sites and availability of food has declined so much over the decades that the population of chimney swifts has declined by 30% over last 3 generations (13 years). In Ontario the chimney swift is listed as "threatened" under the Endangered Species Act (2007).

The chimney swift is just one example of the frightening loss of biodiversity that we are experiencing in Toronto, Ontario, Canada and globally. Around the world, between 200 and 2000 species are lost every year, often due to habitat loss caused by humans. Councillor Michael Layton, September, 2015

Species At Risk: American Eel

Many people are unaware that Ontario has a native eel that lives in Lake Ontario and its tributaries. American Eel have a complex life cycle as they are part of a single breeding population that spawns in only one place in the world – the Sargasso Sea in the North Atlantic Ocean (a large shoreless “sea” off the east coast of the United States surrounding Bermuda). From there young eels drift with ocean currents and then migrate inland into streams and lakes. This journey may take many years to complete, with some eels travelling as far as 6,000 km. After reaching these freshwater bodies, they feed and mature for 10 to 25 years before migrating back to the Sargasso Sea to spawn. Once so abundant you could have gone to Mimico Creek, or the Don and Humber Rivers, and “walked across a stream dry shod on their backs”, the population has declined due to impacts from harvesting, water quality, and in-stream barriers (dams) during the course of their long migration. The American Eel has a long history as a food and commercial product for residents of the upper St. Lawrence River and Lake Ontario. They were also a highly valued fish resource for Indigenous people, particularly the St. Lawrence Iroquois, who depended upon them as winter and travelling food. The American Eel is classified as “Endangered” under the Ontario Endangered Species Act, and efforts are being made to help restore eel abundance in Ontario.





BIODIVERSITY STRATEGY FOR TORONTO

Like most urban centres Toronto has experienced biodiversity loss as the city has grown and natural areas have been replaced first with farm land and then with pavement and buildings. Toronto has a solid foundation of an extensive tree canopy cover, a large connected system of valleys and ravines, tracts of natural, semi-natural areas and waterfront which can, with continued investment, support robust biodiverse ecosystems. Toronto has been proactive in protecting these areas through Official Plan policies and ravine and tree bylaws (see Appendix A: Policy and Governance) in prohibiting development in the most sensitive areas, protecting adjacent tablelands and protecting the tree canopy. The challenge is how to:

- enhance, expand and grow habitat that provides refuge and nourishment for the variety of species, especially species of local concern and species at risk;
- restore our degraded natural areas;
- raise awareness of the plants and animals that live here; and
- identify what actions all of us can take to encourage biodiversity to flourish.

Vision

Imagine a Toronto with flourishing natural habitat and an urban environment made safe for a great diversity of wildlife. Envision a city whose residents treasure their daily encounters with the remarkable and inspiring work of nature, and the variety of plants and animals who share this world. Take pride in a Toronto that aspires to be world leader in the development of urban initiatives that will be critical to the preservation of our flora and fauna. Biodiversity Series, 2011.

Principles

The Strategy is based on the following principles:

1. Biodiversity is fundamental to the health of natural ecosystems and humans

Biodiversity has ecological, economic, social and cultural value. Strong communities and a competitive economy need a healthy natural environment.

2. Biodiversity has an intrinsic value in itself that must be respected and protected

Biodiversity is essential to life on earth and its intrinsic value exists regardless of its value to humans.

3. Integrate Biodiversity into all aspects of city life

There are many things that we can do as a City to support biodiversity through everyday actions, municipal policies and regulations.

4. Focus on habitat

Abundant, well-connected, functioning habitat that provides places to live, forage, shelter and reproduce is the foundation of healthy biodiversity.

5. Use evidence-based planning

Sound policies and actions should be supported by the best available scientific information but must also be nimble to respond quickly to new information.

6. Incorporate the knowledge, innovations and practices of indigenous communities

The knowledge and expertise of Indigenous communities will be sought in development, implementation and review of the Biodiversity Strategy.

7. Collaborate with a broad range of partners

Biodiversity transcends political boundaries and needs to involve a broad range of stakeholders including agencies, community groups, academic institutions, amateur scientists, schools, businesses, environmental organizations and the public in order to achieve success.

8. Consider climate change

Climate change impacts, including among other things, increased summer drought and more intense rainfall, needs to be considered in all biodiversity initiatives in order to effectively address short and long term functional needs of habitat and biodiversity.

9. Measure success

The state of biodiversity and the success of biodiversity initiatives will be measured using appropriate short and long term monitoring methods.

The Challenge

The following provides an overview of challenges posed to a healthy robust biodiversity in the City.

Loss of Habitat and Connections:

Urbanization has resulted in habitat fragmentation and loss that has significantly impacted Toronto's natural heritage, which has reduced the region's carrying capacity for native biodiversity. Two centuries of pollution and poor environmental stewardship have dramatically changed Lake Ontario, the creeks, rivers and wetlands in Toronto. Pollution from salt, silt and road runoff and continuous erosion from large volumes of water is a serious threat to the aquatic ecosystem of our streams and the lake. Many creeks and wetlands have been buried and filled in, like Taddle Creek and Ashbridges Marsh and roads and railways severed connections between natural areas. Forested riparian zones (vegetated banks and floodplain) have been decimated. Air pollution and overuse of natural areas by humans and off-leash dogs is putting additional stress on native flora and fauna, especially many sensitive species resulting in a loss of biodiversity.

Loss of Species:

Many species of wildlife native to Toronto have disappeared or are in at risk of disappearing, and local common species could be at risk if their habitats are further lost, fragmented or degraded.

Birds

Pesticide use, climate change, habitat loss, outdoor cats and collisions with structures have resulted in a significant population decline in birds. Hundreds of migratory birds die each year by colliding with windows that reflect adjacent green spaces. At least 64 of the 162 species of birds that were killed by collisions with buildings have been identified as species at risk (as documented by the Fatal Light Awareness Program (FLAP)).

Butterflies and bees

While many butterfly species still thrive in Toronto's meadows, wetlands, shrub lands and forests, some, especially those with naturally small populations, could not adapt to the loss and fragmentation of habitat and can no longer be found in Toronto. This loss has also resulted in some bee species becoming endangered or even extirpated from the Toronto area.

Fish

Although severely stressed from impacts of pollution and invasive species there 67 native species remaining in the Toronto area. Efforts are being made to improve and restore some of the lost habitat in Toronto's watercourses and in Lake Ontario. Unlike terrestrial plants and wildlife, fishes tend to be forgotten because they are not easily observed. A rich diversity of fishes in our waters is an indicator of good water quality, which is so essential to our existence.

Reptiles & Amphibians

Many reptiles and amphibians lack sufficient habitat to secure the existence of their populations in Toronto in the future and their movement between green spaces and from areas outside of the city's limits has been restricted.

Loss due to invasive species:

The native natural plant communities in Toronto's ravines and woodlands developed over thousands of years. The fragile inter-relationship that exists within these various plant communities can be significantly impacted by dangerous non-native species.

Non-native Invasive species can be introduced in many ways, such as when compost and leaves of non-native plants are dumped into a ravine or when invasive plants are planted close to ravines allowing the plants to spread into them.

Invasive species often look similar to their native counterparts, however they differ in their ability to regenerate and compete with other plants and organisms within the ecosystem. For example, the Norway maple will easily out-compete other vegetation and will dominate a site, blocking sunlight from the understory such that native shrubs and plants cannot grow, leading to problems such as soil erosion and slope failure. In contrast native northern red oak trees allow more light to reach ground level resulting in a brighter forest environment with a greater number of plant species on the forest floor. Invasive species often displace all other plants growing with them and over time can form single species habitats.

Habitat created by single non-native species have not co-evolved with native wildlife and cannot offer the same benefits to wildlife that native species can. For example, non-native trees support fewer invertebrate species, therefore fewer bird species since many species of songbirds forage on invertebrates found in trees.

Examples of invasive species found in Toronto include dog-strangling vine, Norway maple, garlic mustard, rusty crayfish, emerald ash borer and gypsy moth.

In 1967 Dutch elm disease decimated the elm population in Ontario. Almost overnight, the look of many beautiful tree lined streets in the cities across the province had changed as they lost their beautiful towering elm trees. Most tree pests are species specific. Planting a diverse street tree population will ensure sustainability of the streetscape and will support the long-term resilience of the entire urban forest.

The loss of ash trees to the non-native emerald ash borer beetle has had significant impact on ash trees and on the ash bolete (*Boletinus merulioides*) mushrooms which depend on the ash trees.

Climate Change:

The predicted future climate of Toronto, with more heat waves and more extreme weather events, will also impact the viability of existing species and will result in new species being introduced, which could infest or outcompete native species.

Temperature and changing weather patterns affects life cycles of many species. Trees and shrubs function as silent canaries in the wooded coal mine: the first indicators of local and global impact of human activity. Elm, ash, beech, butternut and chestnut trees are vulnerable to the introduction of invasive insects and fungi, and the distributions of trees and shrubs are significantly affected by climate change.

Impacts from humans and pets:

Foraging for food, letting dogs run off-leash, cutting wild flowers, removing plant material, walking off the designated path, dumping leaf litter, all these activities can result in compacting the soil, trampling plant material, and/or disturbing the stability of a natural area. These actions occur due to a lack of awareness of the importance and fragility of the natural ecosystem. Increased awareness and understanding will lead to the advocacy and support necessary for implementation of actions, investment, policies and regulations.

Proposed Actions

The following section sets out a series of actions to enhance the quality and quantity of biodiversity and increase awareness of and access to nature grouped under the themes of Restore, Design and Engage. Each section includes stories on successful initiatives in the City and elsewhere to illustrate and inspire.

Restore

An in-between landscape, somewhere between pristine and disfigured, perhaps even, as Leanne Betasamosake Simpson portrays it in “Life By Water” (An Enduring Wilderness: Toronto’s Natural Parklands) a landscape of nature degraded, a tamed, almost lifeless wilderness. Of Robert Burley’s Photographs, Park Planning and Wilderness Degraded, Rodney White Toronto Planning Historian 2018

To restore biodiversity in the city and protect species at risk, healthy habitats need to be enhanced and expanded. Healthy habitat is about places that provide refuge, shelter, food and water sources, and breeding grounds. It can mean creating stopovers that provide food and shelter for migrating species. Restoring habitat can include planting native trees and shrubs; leaving downed woody debris and understory vegetation and replacing turf grass with meadows. It can mean restoration and adaptive management of our forests and wetlands; enhancing the health of soil and water; improving the diversity of native vegetation; and removing non-native invasive species.

Approximately 600,000 trees of 116 different species line approximately 5,400 km of streets in Toronto. Among many other benefits, street trees provide shade, protection from the elements and purify the air in the neighbourhoods.

Proposed Actions to Restore Habitat

1. Develop “Regional Species of Concern Action Plans” for priority species at risk found in Toronto that are consistent with federal and provincial recovery strategies and species that are declining regionally but have not been listed. These Action Plans would be developed by TRCA through research in collaboration with PFR, City Planning, the Royal Ontario Museum (ROM), universities, environmental groups and amateur scientists and would include guidelines for enhancing and creating habitat, measures for protection, a strategy for monitoring life-cycles and an implementation plan. The Action Plans would include one for the Chimney Swift.
2. Develop a list of “extirpated” species that, through creation and enhancement of habitat, could be encouraged to return and a strategy to support a return. Examples could include the Northern river otter, Eastern Ribbon Snake, Western Chorus Frog, and Karner Blue butterfly. To be led by TRCA, in collaboration with PFR and City Planning.
3. Identify priority sites and coordinate investment to remove invasive species led by PFR and in collaboration with the TRCA and through the Ravine Ecological Services Working Group (identified in the Ravine Strategy). This will support biodiversity by opening up the canopy to allow understory native plants to thrive.
4. Continue to implement actions and communicate information about invasive species identified in the TRCA’s Invasive Species Strategy including information on the impact of non-native invasive species, the importance of biodiversity and how the community can help prevent spread of invasive species. To be led by TRCA in collaboration with PFR.
5. Develop an “Urban Integrated Restoration Priorities” database of restoration opportunities in the City. The work will be led by TRCA in partnership with PFR and in collaboration with other agencies and partners to strategically implement the opportunities.
6. Undertake baseline inventories and monitoring of biodiversity health in partnership with the TRCA, PFR, academic and educational institutions and in conjunction with work on the Ravine Strategy.
7. Seek opportunities to integrate the objectives of the Biodiversity Strategy in the development of planning studies and new secondary plans.

Restore Success Story: Ecosystem restoration - Blythwood Ravine

The goal of this work undertaken by the City is to restore the City's most valuable ecosystems by supporting the growth of native species. The work includes protecting growing conditions, removing the invasive species that had taken over the site and re-planting the native species.



Blythwood Ravine before restoration



Blythwood Ravine after restoration

This small ravine near Mount Pleasant Road had been disturbed by mountain biking until 2007. The slopes were overgrown with invasive trees and shrubs like Norway maple, Manitoba maple and buckthorn. The bottom of the small ravine was compacted and there was no vegetation at all.

In 2011 the site was closed for bicycles, invasive trees were removed and a mix of native trees, shrubs and herbaceous species was planted. In 2015, four years after planting, the site looks very different and supports the growth of healthy robust vegetation.

Restore Success Story: TRCA's Invasive Species Strategy

The Problem with Invasive Species



Invasive species are defined as harmful alien species whose introduction or spread threatens the environment, the economy, or society, including human health (OMNR, 2012)

MANAGEMENT

Once invasives plants are established, it is difficult to eradicate them from the environment. Invasives are excellent reproducers and their seeds can often survive in the soil for decades. Management is costly and often requires herbicides.

HABITAT

Though some animals and insects use invasive plants as a habitat, a significant majority do not, which decreases biodiversity. In fact, invasives are only second to habitat loss as the largest risks to species in Ontario.

ECOLOGY

Native species evolved together creating a 'checks and balances' system that prevents any one organism from taking over on a large scale. Non-native invasive species evolved without these checks, thus allowing them to establish and spread quickly.



Dog Strangling Vine

ECONOMICS

Management of invasives and habitat loss is costly. In the U.S. alone, these costs exceed \$100 billion annually. There is no estimate for Ontario.

ONTARIO

Ontario has the highest number of invasives in Canada due to its importance as a global market for goods and favourable climate.

EDUCATION

Public education about invasives is critically important. Landowners, gardeners, and nature enthusiasts can help with reporting and early detection as well as making informed planting decisions.



European Buckthorn



Common Reed



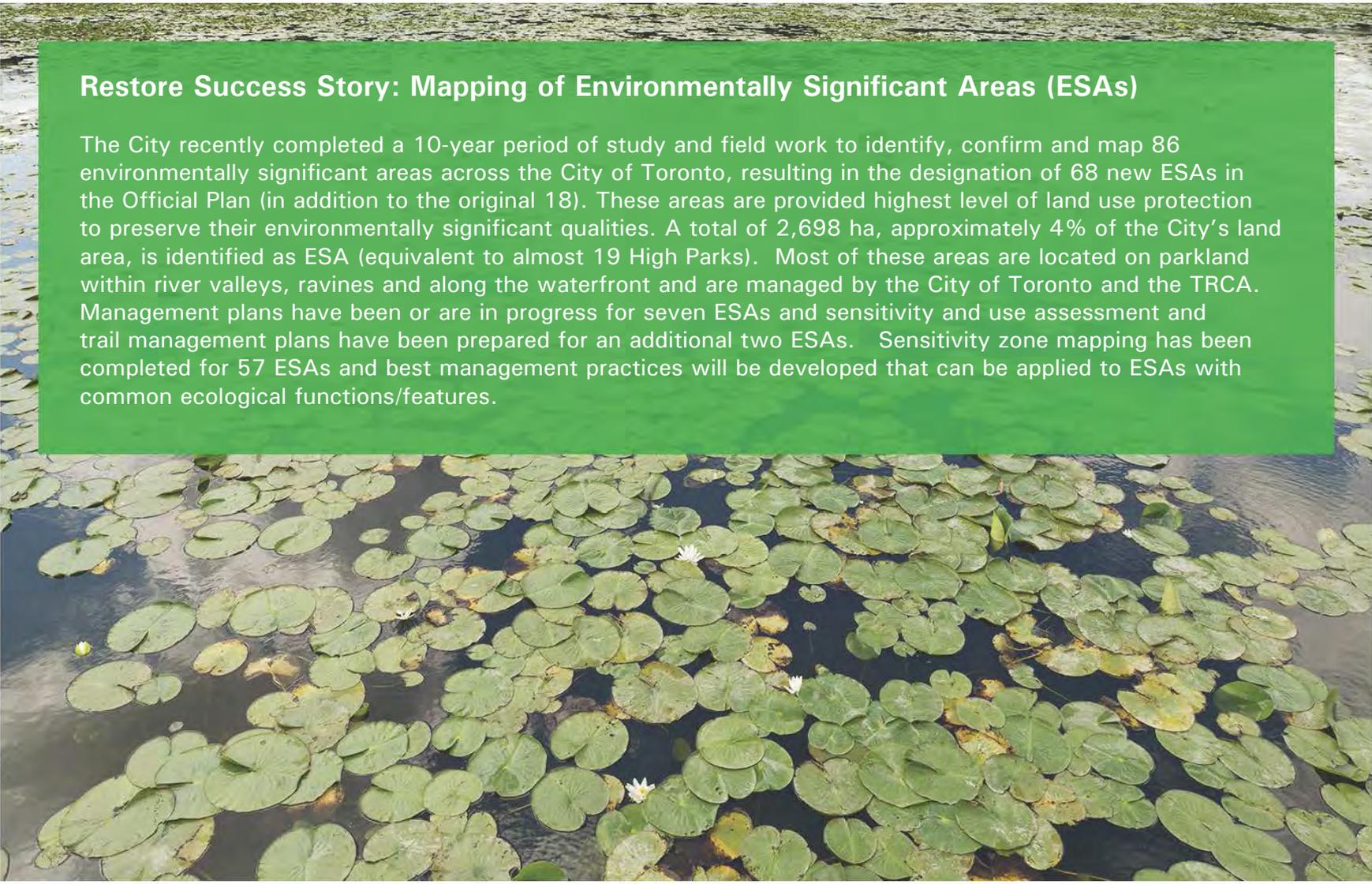
Garlic Mustard



Norway Maple

Source: Ontario Ministry of Natural Resources (OMNR), July 2012. Ontario Invasive Species Strategic Plan. Toronto: Queen's Printer for Ontario, 58 pp.

The TRCA's "Invasive Species Strategy" identifies prioritized invasive species found in Toronto and emerging invasive species on the region's doorstep. These plans address the current state of select invasive species related to their context and provide prevention strategies.



Restore Success Story: Mapping of Environmentally Significant Areas (ESAs)

The City recently completed a 10-year period of study and field work to identify, confirm and map 86 environmentally significant areas across the City of Toronto, resulting in the designation of 68 new ESAs in the Official Plan (in addition to the original 18). These areas are provided highest level of land use protection to preserve their environmentally significant qualities. A total of 2,698 ha, approximately 4% of the City's land area, is identified as ESA (equivalent to almost 19 High Parks). Most of these areas are located on parkland within river valleys, ravines and along the waterfront and are managed by the City of Toronto and the TRCA. Management plans have been or are in progress for seven ESAs and sensitivity and use assessment and trail management plans have been prepared for an additional two ESAs. Sensitivity zone mapping has been completed for 57 ESAs and best management practices will be developed that can be applied to ESAs with common ecological functions/features.

Design

Viewing cities as part of the natural world, rather than separate from it to inspire a new aesthetic for urban design. The Granite Garden Anne Whiston Spirn,

Our urban environment can ‘cohabit’ with nature – imagine a city that is supportive of life and growth both for people and other plant and animal species designed in a way that a diversity of species can live together. Recast urban design as a form of a ‘new activist joint urban and environmental stewardship whose project is to create footholds for biodiversity.’ Toward an Urban Ecology – Kate Orff SCAPE)

If we think of the city as part of nature – how can our urban environment best cohabit with the natural world? How can we design our built form to support healthy ecosystems – to give biodiversity a foothold, however small, to grow and spread along street right-of-ways, on rooftops; in tiny rain gardens, backyards, wildflower meadows; to insert green connections between pockets of habitat; to provide crossings over or under roads and rail corridors; to build artificial habitats to provide new shelter; to design buildings and structures to reduce bird collisions by making glass visible. Strategic habitat interventions and corridors will better integrate the city’s natural heritage system and open space network and contribute to a more biodiverse and resilient urban ecosystem.

Proposed Actions to Design the built environment with biodiversity in mind

8. Continue to advance “Design Best Practices for Biodiversity” for buildings, sites and the public realm (sidewalks, streets and parks) that would inform architects, landscape architects and planners on how to incorporate habitat into new development and functionally support nearby habitat. To be led by City Planning in partnership with PFR, TRCA and relevant stakeholders.
9. Incorporate criteria to encourage biodiversity into the evaluation of the Urban Design Awards.
10. Continue to identify opportunities within the Natural Heritage System for potential ‘eco passages’ to facilitate wildlife migration and reduce road mortality. Co-ordinate implementation with capital budget for roadwork. A number of eco-passages have already been designed and installed along Sewell’s Road in the Rouge National Urban Park. This work is led by TRCA in collaboration with City Planning, PFR and Transportation Services.

11. Identify additional opportunities to create habitat in utility corridors including refuge and stopovers for species such as birds and butterflies. This work is led by TRCA in partnership with PFR.

12. Develop a 'Best Practices for Mowing' guide for parks, road right-of-ways and utility corridors to protect habitat in parks and natural areas and encourage creation of habitat through naturalizing underused mowed areas. This work will be led by PFR with support from City Planning in collaboration with Transportation Services and Hydro One.

Design Success Story: Bird-Friendly Development Guidelines

Toronto is on the convergence of two major migratory flyways. Each year millions of birds pass through Toronto on their way to breeding grounds in the Boreal forest in the spring and then again in the fall on the way to their wintering grounds in southern latitudes. In 2007, Toronto was the first City in North America to publish Bird-Friendly Development Guidelines - a comprehensive list of building design and operation strategies to make new and existing buildings less dangerous to migratory birds. The guidelines were developed with the participation of architects, development corporations, property management corporations, bird advocacy groups and City staff. This initiative has greatly assisted in drawing attention to the need to mitigate the dangers the urban environment poses to migrating birds and demonstrated how cities can play a role in reducing migratory bird deaths. Toronto's leadership in initiating this resulted in many other cities across North America approaching city staff to learn from our experience. In 2016 the City published "Best Practices for Bird-Friendly Glass" and in 2018 "Best Practices for Effective Lighting", which updated our bird-friendly strategies. More recently, the Ministry of Municipal Affairs has engaged the Canadian Standards Association to develop a national set of bird friendly guidelines based on the Toronto approach.



Design success story: Bird Blind East Point Park

The project is part of a citywide initiative to enhance and protect bird habitat and increase birding activity through public education programming. A Viewing Pavilion, Bird Blind and entry signage will enhance the East Point birding experience. East Point's pavilions provide shelter and gathering spaces and are vantage points for Lake Ontario and pond views.



Design Success Story: Darwin's Hill, University of Toronto

The west slope of Darwin's Hill is planted in ascending rows of 2-metre-high trees as a living laboratory for study. Planted in alphabetical order by botanical name each row showcases one of 18 deciduous, native tree species recommended by the City of Toronto for naturalization — a contribution to the urban canopy and a valuable resource and daily opportunity for students, local designers, and the public to witness seasonal changes and to study each tree's unique morphology and growth rate.



Engage

“If each of us becomes aware of the rich variety of life forms, their beauty and their critical roles within the varied ecosystems of Toronto, we will surely be inspired to protect this natural heritage.” Margaret Atwood and Graeme Gibson, Biodiversity Series, 2011

A key factor in the success of a strategy to create a healthier biodiverse ecosystem is the awareness of the public about the importance of biodiversity and the fragility of the existing ecosystem. Toronto has a wealth of engaged citizens who are committed and passionate about biodiversity and our natural areas and who want to contribute. This is evident in the collaborative process that produced the Biodiversity Booklet series and the Pollinator Strategy and the many volunteers who participate in planning and restoring natural areas.

There is a growing interest in access to nature among individuals of all ages in our communities and neighbourhoods. Although many solutions lie in government policy, as individuals and citizen we can all help to make this awareness mainstream. People will protect and invest in what they love and understand.

Proposed Actions to explore opportunities to enhance the experiential values of biodiversity through education, celebration and participation:

13. Identify opportunities to undertake an innovative collaborative art project to create habitat for regional species of concern and/or extirpated species. The work will be led by PFR in collaboration with the TRCA, EED, Transportation Services, environmental groups, the local community, universities, designers, and artists. An example could be to engage the local community and environmental groups in creating habitat in High Park to re-introduce the Karner Blue butterfly in conjunction with events/educational information (see best practice example Oyster-tecture New York City).

14. Work with artists, the local community, and environmental groups to create interpretive art that engages and informs the public about native flora. (see Best Practices Florium Des Alps). The work will be led by PFR in collaboration with City Planning.

15. Building on the work of the Pollinator Strategy, EED to work with relevant partners such as Canadian Wildlife Federation, Monarch Watch, World Wildlife Fund and Carolinian Canada to promote existing certification programs to recognize Toronto

16. Develop a self-guided tour with geo-referenced downloadable podcasts about the urban wildlife found along a subway route in Toronto based on the Reconstructing and Mapping Toronto's original Landscape and Ecology project noted above, and the Biodiversity series of booklets. To be led by City Planning and PFR in collaboration with the ROM, TRCA, universities, environmental groups and amateur scientists (Concept derived the innovation initiative SAFARI 7 in New York City – see best practice example).

17. Develop and implement a Campaign to inform the public and city staff about the importance of urban biodiversity and what they can do to support urban biodiversity. The Campaign could include a web-based option and toolkit on how to enhance biodiversity for existing properties (neighbourhoods, backyards, apartment blocks, schools, commercial and industrial areas). To be led by PFR in collaboration with EED, City Planning and TRCA.

18. Complete additional booklets in the Urban Biodiversity series, to be led by City Planning in collaboration with PFR, the ROM, TRCA, universities, environmental groups and amateur scientists. Possibilities include wildflowers, wasps, dragonflies and damselflies, ants and aquatic invertebrates.

19. Develop a data base and visualization tool that reconstructs and maps Toronto's original landscape and ecology around the time of European contact. To be led by City Planning in partnership with PFR, TRCA and Toronto area universities.

Reconstructing and Mapping Toronto's Original Landscape

Biodiversity health depends on reviving and restoring the landscape. Part of our understanding of biodiversity involves understanding the past landscape - where streams flowed, the location of the shoreline and where different natural habitats existed. Reconstructing and mapping Toronto's original landscape and ecology around the time of European contact will allow the City to compare and measure past and current landscape and ecology; inform current habitat restoration and resiliency planning; study the significant role of Indigenous people on the landscape and ecology; communicate about the impacts of landscape change on the natural and built environment; provide a landscape platform for city-wide and area based plans; and inform future urban planning scenarios. The project will create a data base and visualization tool that presents Toronto's past landscape and ecology georeferenced to the street grid of the City of Toronto.

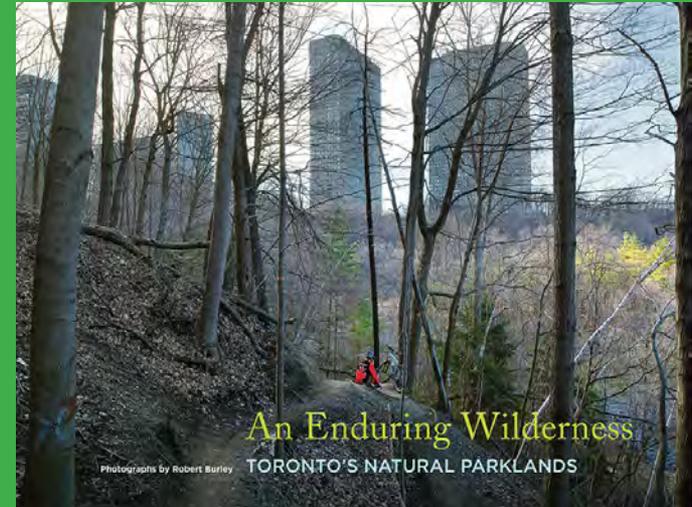


Engage Success Story: The Biodiversity Series

The Biodiversity Series is produced by the City in collaboration with local institutions, universities and amateur scientists. The goal of the Series is to help re-connect people with the natural world, raise awareness of the seriousness that biodiversity loss represents and how it affects them directly and help cultivate a sense of stewardship in residents. Each booklet provides information on the current state of local biodiversity for a particular taxa and opportunities to appreciate the variety of non-human species inhabiting Toronto. They describe how current City policies, procedures and operations can be enhanced, altered or revised in order to help mitigate local biodiversity loss and engages residents on what they can do to enjoy and protect our local flora and fauna.

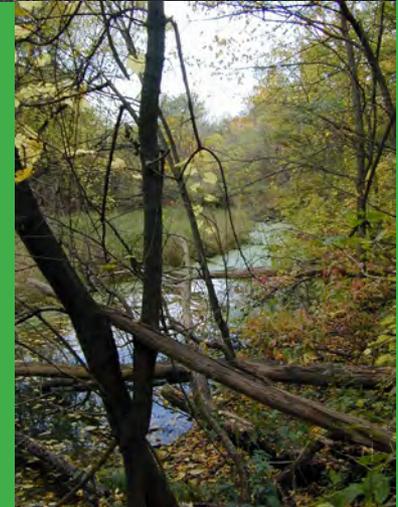
Engage Success Story: An Enduring Wilderness – Toronto’s Natural Parklands

Enduring Wilderness is a book of landscape photographs and essays which document and celebrate the extensive and ecologically diverse natural areas found within Toronto’s parkland system. The book also provides a history of these spaces and includes a compendium of Toronto’s ESAs and information about the key natural features, habitats and species found in these areas.



Engage Success Story: Todmorden Mills Wildflower Preserve

Todmorden Mills Wildflower Preserve is a 9 hectare natural area in the Don Valley, Toronto. The site consists of a remnant portion of the Don River and associated floodplain and is bordered by steep slopes of the Don Valley. Volunteers are working with corporate and local government partners to restore the site, gradually re-establishing native trees, shrubs and wildflowers. Wildlife is also reappearing.

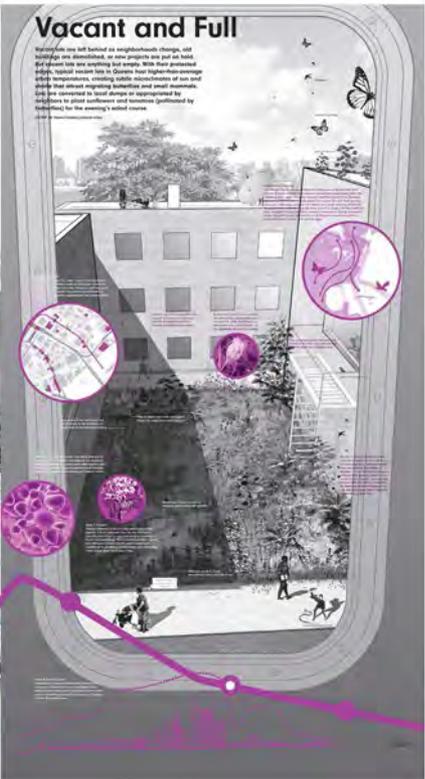
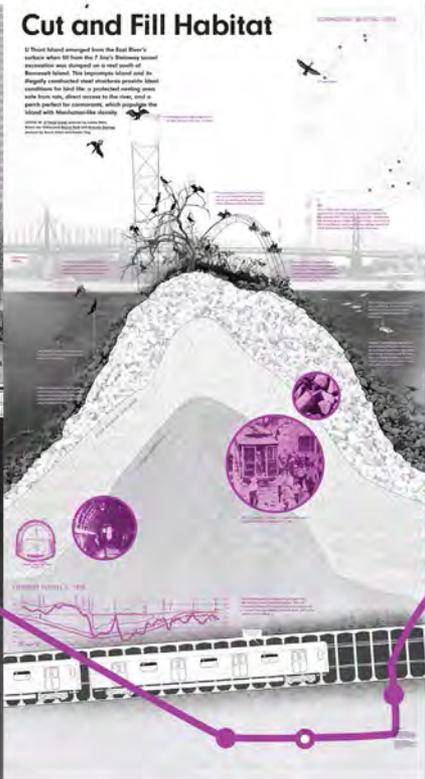
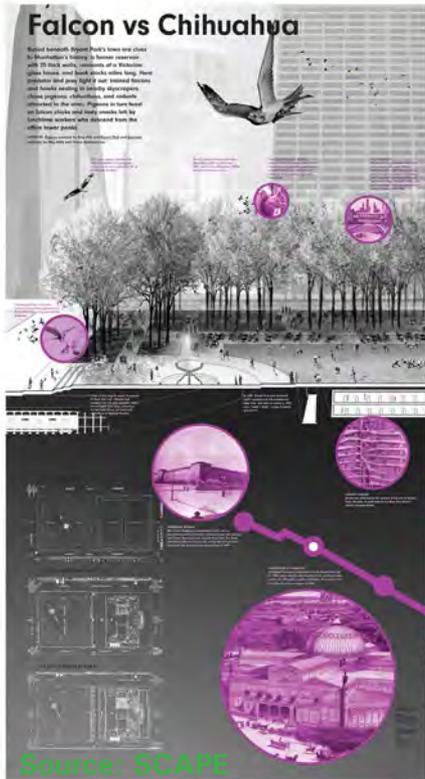




Engage Best Practice: Oyster-tecture, New York City

Oyster-tecture, part of the Rising Current exhibition at Museum of Modern Art in 2010 is an initiative to develop adaptation strategies for New York City in the face of climate change and sea level rise and to engage and inspire New Yorkers to reconnect with their harbour. Oyster-tecture envisions an active oyster reef that diversifies aqueous marine life and recreational potential in the New York Harbour. It proposes a living reef composed of a woven web of 'fuzzy rope' that supports marine growth, generates a 3D landscape mosaic that attenuates waves and cleans millions of gallons of harbour water by harnessing the biotic filtration processes of oysters mussels and eelgrass. (www.scapestudio.com)

Drawing illustrating potential Oyster beds in New York City (Source: SCAPE)



Engage Best Practice: Urban Landscape Lab's SAFARI 7, New York City.

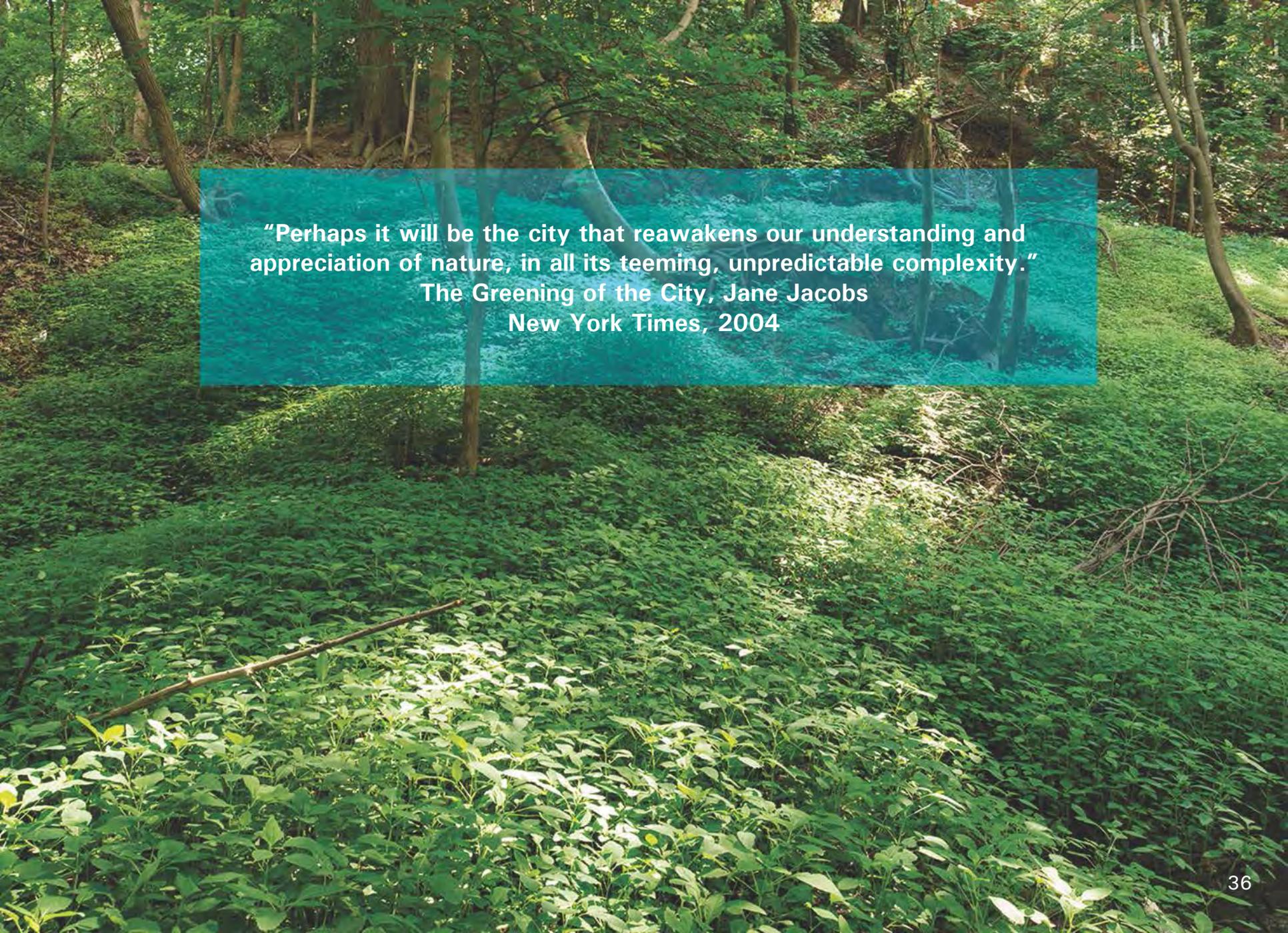
SAFARI 7, is "... a self-guided tour, using downloadable pod casts keyed into subway maps, of urban animal life along New York City's 7 subway line shows what animals live along the route with interactive platform from which to view, celebrate, research and exchange ideas about urban nature." (Toward an Urban Ecology) The project engaged the NYC Transit, schools, college students and volunteers to help share information.



Engage Best Practice Example: Florarium Des Alps (designed by Atelier ARI)

The Florarium pavilion displays plant material found in a local area in the Alps and shows them as a compilation of pressed flowers, leaves, grasses, mosses and twigs in a large 'stained-glass-like' window. The conical shaped Florarium is situated in a way the incoming sunlight exposes the veins and other details of the natural elements.

The making of the artwork was part of the yearly festival *Parcours des Fees*, where artist and architects from different countries come together for two weeks to build their projects. The objects are placed along a beautiful walking trail that starts through the valley and loops back through the forest higher up the mountain. Atelier ARI were also the designers of the 'Wind Station' winning submission for the 2018 Winter Station project in Toronto.

A photograph of a lush, green forest. The foreground is filled with dense, low-growing vegetation, possibly wildflowers or weeds, in various shades of green. In the background, taller trees with green foliage form a thick canopy. Sunlight filters through the leaves, creating dappled light on the ground. A semi-transparent teal rectangular box is overlaid in the upper-middle section of the image, containing white text.

“Perhaps it will be the city that reawakens our understanding and appreciation of nature, in all its teeming, unpredictable complexity.”
The Greening of the City, Jane Jacobs
New York Times, 2004



APPENDIX A: POLICY AND GOVERNANCE

International

In 1992, global leaders made a commitment to stop the loss of biodiversity through the United Nations Convention on Biological Diversity. The United Nations took a clear position declaring 2011-2020 the Decade of Biodiversity and Canada was a signatory to the Convention. The Biodiversity Convention is about global sustainable development, which requires the conservation of biodiversity and the sustainable use of biological resources. It conveys an understanding of the relationship between human activity and the natural world and the need to sustain living organisms, genetic diversity and the integrity of ecosystems.

Federal

Canadian Biodiversity Strategy - “Doing Our Part to Conserve Biodiversity and Sustainably Use Biological Resources” (1995): was prepared in response to Canada’s obligations as a party to the United Nation’s Convention on Biological Diversity. The Strategy contains guiding principles supporting sustainability, a framework for sustainable development, goals related to conservation, education, support and collaboration with a focus on tangible, easily measured actions related to species. The Strategy was also intended to serve as a voluntary guide for urban and regional governments. In 2016, the federal government developed a “Biodiversity Outcomes Framework” that intends to develop a deeper understanding of the value of biodiversity; collect information on the state of Canada’s ecosystems; and, set vision and goals.

Species at Risk Act (SARA) 2002: is designed to meet one of Canada’s key commitments under the International Convention on Biological Diversity. The Act identifies four increasingly at-risk categories – “Special Concern”, “Threatened”, “Endangered”, and “Extirpated”. The purpose of the Act is to prevent wildlife species in Canada from disappearing; to provide for the recovery of wildlife species that are extirpated, endangered, or threatened as a result of human activity; and to manage species of special concern to prevent them from becoming endangered or threatened. In Ontario, the Endangered Species Act, 2007 (ESA) protects species under the Species at Risk in Ontario List (SARO), which lists the species under SARA that are found in Ontario. The SARA encourages the various levels of government in Canada to cooperate to protect wildlife species but does not require any specific actions on the part of municipal governments.

Fisheries Act: contains two key provisions on conservation and protection of fish habitat essential to sustaining freshwater and marine fish species. The Department of Fisheries and Oceans administers section 35, the key habitat protection provision, prohibiting any work or undertaking that would cause the harmful alteration, disruption or destruction of fish habitat. Environment and Climate Change Canada administers section 36, the key pollution prevention provision, prohibiting the deposit of deleterious substances into waters frequented by fish, unless authorized by regulations under the Fisheries Act or other federal legislation. The Act also includes Regulations on Aquatic Invasive Species that includes an aquatic invasive species list. The Round Goby, an aquatic invasive species found in Toronto's waters, is regulated under the Fisheries Act.

Migratory Birds Convention Act: contains regulations to protect migratory birds, their eggs, and their nests from hunting, trafficking and commercialization. A geographical area may be designated as a Migratory Bird Refuge under this convention. There are nine Migratory Bird Sanctuaries in Ontario, the last one to be designated in 1971. None are in urban areas.

Provincial

Ontario's Biodiversity Strategy – "It's in our Nature – Ontario Government Plan to Conserve Biodiversity" (2011): identifies goals, objectives and actions to conserve Ontario's biodiversity and urges all sectors, including municipalities, to develop implementation plans. The Plan commits the Ministry of Natural Resources and Forestry (MNRF) and the Ministry of the Environment and Climate Change (MOECC) to develop "an integrated, broad-scale monitoring program for all aspects of Ontario's biodiversity", with targets for engaging people, reducing threats, enhancing resilience, and improving knowledge.

The Implementation Plan for Ontario's Biodiversity Strategy (2012): contains a high-level overview of the mandates and biodiversity conservation roles for the member ministries of the Ontario Public Service Biodiversity Network as issues such as climate change and biodiversity loss cannot be addressed by one single ministry or division. In addition to MNRF, the roles for 14 other ministries are outlined in the plan. However, there is no mechanism to ensure accountability of these ministries so there is no means of ensuring its implementation.

Endangered Species Act, 2007 (ESA): protects species under the Species at Risk in Ontario List (SARO), which is provided in Ontario Regulation 230/08. The ESA protects the general habitat of a listed species and requires the Ministry of Natural Resources and Forestry (MNRF) to develop a recovery strategy for a species once it is listed on SARO. The ESA uses the same four categories as SARA mentioned above. In Toronto, there are a number of migratory birds identified in addition to nesting birds.

Wetland Conservation Strategy (2017): is a framework to guide the future of wetland conservation across the province. The intent of the Strategy is to establish a common focus to protect wetlands, so that Ontario can achieve greater success in a more efficient and effective manner. A comprehensive suite of actions that the Ontario government is taking, or will take, is a critical part of the Strategy. These actions include improving Ontario's wetland inventory and mapping as a cornerstone of our strategy. Other key actions include developing policies and tools to prevent the net loss of Ontario's wetlands, and improving evaluation of the significance of Ontario's wetlands.

Natural Heritage Reference Manual (2010): is the Province's recommended technical criteria and approaches for being consistent with the Provincial Policy Statement in protecting natural heritage Features and areas and natural heritage systems in Ontario.

Fish and Wildlife Conservation Act, 1997 (FWCA): regulates fishing and hunting in Ontario. It protects nests and eggs of wild species of birds. The FWCA also protects mammals, reptiles, amphibians and invertebrates, several of which are found in Toronto. The Schedules of the Act lists several specially protected species.

Invasive Species Act, 2015: The Act provides for the classification of invasive species into 1) "prohibited" invasive species or 2) "restricted" invasive species. Essentially, prohibited invasive species are not allowed to be brought into Ontario, released, be in possession of, propagated, or be bought or sold in Ontario; restricted invasive species are not allowed to be brought into provincial parks or conservation reserves, or released in Ontario. The Act provides for the classification of invasive species through the biological characteristics of, potential harm from, dispersal ability of, and social or economic impact of the species. Once a species is classified, the Act provides for the preparation of prevention and response plans for the province or a specific area within Ontario. These response plans will set out measures, practices or recommended courses of action to deal with an invasive species.

Other provincial policies that support Biodiversity include:

The Provincial Policy Statement 2014 (PPS): provides policy direction on matters of provincial interest related to land use planning and development; municipalities are required to bring their Official Plans into conformity with the PPS. Biodiversity is included in the Vision for Ontario's Land Use Planning System: "Ontario's long-term prosperity, environmental health, and social well-being depend on conserving biodiversity, protecting the health of the Great Lakes, and protecting natural heritage, water, agricultural, mineral and cultural heritage and archaeological resources for their economic, environmental and social benefits." The PPS provides clear policy direction regarding protection and enhancement of biodiversity and its ecological functions. Specifically:

Section 1.1.1 h) development and land use patterns conserve biodiversity in the context of resiliency and climate change.

Also, section 2.1.2 links biodiversity, surface and groundwater features within the context of natural heritage system planning; and, 2.1.3 directs municipalities to create natural heritage systems.

The Growth Plan (2017): for the Greater Golden Horseshoe (GGH) provides guidance on where and how to grow. It guides decisions on a wide range of issues - including transportation, infrastructure planning, land use planning, urban form, housing, natural heritage and resource protection - in the interest of promoting economic prosperity. The Introduction to the Growth Plan notes the importance of the GGH natural areas in supporting biodiversity. Section 4 states that protecting natural heritage features and areas figures prominently in the importance of planning for the future and requires natural heritage mapping (for areas outside of settlement areas) for the protection of the region's natural heritage and biodiversity. The importance of hydrologic functions are identified as targets for the protection and restoration of riparian areas in the "Definitions" section under "Watershed Plan" - hydrologic functions are directly related to the ecosystem service provided by biodiversity found within these riparian areas.

The Greenbelt Plan (2017): is a cornerstone of the Growth Plan and identifies where urbanization should not occur in order to provide permanent protection to the agricultural land base and the ecological features and functions occurring on this landscape. The Greenbelt Plan provides a continuous and permanent land base necessary to support human and ecological health in the Greenbelt and beyond. The Natural System policies protect areas of natural heritage, hydrologic and/or landform features, which are often functionally inter-related and which collectively support biodiversity and overall ecological integrity. Within the City of Toronto, the Greenbelt includes the Rouge Valley and Urban River Valley connections.

City of Toronto

The Official Plan (OP): is a statutory document that guides land use in the City. The Official Plan envisions Toronto as:

“a city with: ... a connected system of natural features and ecological functions that support biodiversity and contribute to city life.”

The Plan recognizes the importance of a healthy natural environment to strong communities and a competitive economy. Policy 3.4.1 specifies that changes to the built environment will be “environmentally friendly, based on: sustaining, restoring and enhancing the health and integrity of the natural ecosystem, supporting biodiversity in the City and targeting ecological improvements, paying particular attention to: seasonal movements of migrating species; opportunities for habitat provided by the built environment; and the potential impacts of a changing climate on biodiversity and ecosystem health.” The OP policies also identify a City-wide Natural Heritage System and protect Environmentally Significant Areas (which contain habitats of unusual size or high diversity, rare plant and animal species, unique landforms, and stopover locations for migratory wildlife and colonial breeding habitat).

These OP policies work together with the Ravine and Natural Features Protection Bylaw and TRCA Ontario Regulation 166/06, which help to ensure plants and animals are able to continue their existence and necessary ecological processes by protecting ravines and valley lands, which is where most of the City’s biodiversity is located. When the OP was being written after amalgamation, The City and TRCA worked together to develop the City’s Natural Heritage System based on TRCA’s Terrestrial Natural Heritage System Strategy.

Ravine and Natural Feature Protection Bylaw

The Ravine and Natural Feature Protection By-law is a tool to protect important natural features that are vulnerable to degradation due to removal of trees, changes in grade or lack of management. It builds upon previous ravine protection By-laws by expanding the area of protection beyond the ravine system to include tableland forests and forested portions of the Lake Iroquois shoreline. The natural features protected by the By-law perform important functions, provide habitat for a wide variety of native plants and animals and help sustain local biodiversity.

Green Roof Bylaw: the City of Toronto Green Roof Bylaw contains both requirements for new development and the Toronto Green Roof Construction Standard and sets out a graduated green roof requirement for new development or additions that are greater than 2,000 m² in Gross Floor Area. The requirement ranges from 20-60% of the Available Roof Space of a building. Green roofs have many environmental benefits. They help reduce the effects of the urban heat island and associated energy use, manage stormwater runoff (reducing the pollutants that enter our waterways), improve air quality and beautify our city. Green roofs also provide an opportunity to create habitat and enhance biodiversity in the urban fabric of the City.

Strategic Forest Management Plan (2012) provides the vision, strategic goals and actions for sustaining and expanding the urban forest over the next 10 years. The Management Plan also contains a monitoring plan with specific indicators of success against which progress will be measured. This document is important to biodiversity as the City's forests provide habitat and its health depends of the biodiversity of tree species. The Management Plan highlights the ecological functions of the urban forest and strategies for enhancing it, which will also support urban biodiversity.

Toronto Parks Plan (2013-2017): guides Parks, Forestry and Recreation's delivery of service over the next five years. The Parks Plan directions and recommended actions aim to connect people and communities with parks, advance greening and environmental sustainability, improve the quality of parks, and build a legacy park system for Toronto. The Parks Plan acknowledges and highlights the role Parks play in protecting and nurturing natural environments. How they provide habitat for plants and animals, support biodiversity, and protect geological and geographic features. Their role in improving water quality and flood management, playing a vital role in keeping the air clean and cool by counteracting the damaging effects of pollution and buffering against the effects of climate change.

Toronto Ravine Strategy (2017): The Strategy will provide a strong framework for future decision making in ravines. It will help to better manage the multiple pressures and interests in these landscapes while ensuring that the foundation for all decisions is maintenance of a healthy ravine system that connects people with nature in a positive and sustainable way. The guiding principles of the Ravine Strategy are Protect; Invest; Connect; Partner; and Celebrate.

Other Agencies that work to support Biodiversity include:

TRCA – “The Living City Policies” (LCP) (2014): The Toronto and Region Conservation Authority (TRCA) area of jurisdiction is watershed based, covering all of Toronto and parts of Peel, York and Durham regions. The LCP provides a vision for a healthy, attractive, sustainable urban region prospering into the next century. This vision is meant to be realized through working with partners like the City of Toronto, to ensure that the Toronto region is built on a natural foundation of healthy rivers and shorelines, greenspace and biodiversity and sustainable communities. TRCA also has a series of technical guidelines providing guidance on best practices for implementing the LCP, including those policies to protect and enhance biodiversity in the context of planning and permits. The Guidelines cover such topics as valley and stream corridor crossings, environmental impact studies, stormwater management criteria, wetland water balance, and field staking.

TRCA – Species of Regional Conservation Concern

The TRCA has developed a list of Species of Regional Concern of terrestrial flora and fauna. The list is updated regularly, the last update was July 2017. The TRCA list of Species of Regional Concern does not necessarily correspond to federal or provincial species at risk (SAR). For example, barn swallows are a SAR, but not a TRCA Species of Regional Concern. The TRCA lists species considered to be of regional conservation concern within their jurisdiction. They may not be currently rare, but are highly sensitive to habitat loss and disturbances associated with changes in the surrounding habitat.

TRCA – Watershed Plans

The TRCA has developed watershed plans on all the watersheds within their jurisdiction including the Mimico Creek, Humber, Don, Highland Creek, Rouge, Petticoat Creek and Lake Ontario Waterfront, which are all found in Toronto. The watershed plans provide management recommendations regarding biodiversity in the context of Natural Heritage Systems planning, stewardship and nature-based recreation. These plans support the Growth Plan 2017 requirements for this.

Parks Canada - Rouge National Urban Park (RNUP) is Canada's first national urban park and is situated in the northeast corner of the City and located within the municipalities of Toronto, Markham, Pickering and Uxbridge. The park will extend from Lake Ontario north to the Oak Ridges Moraine. Rouge National Urban Park is a rich assembly of natural, cultural and agricultural landscapes, home to over 1,700 species of plants and animals, some of the last remaining working farms in the Greater Toronto Area, rare Carolinian ecosystems, Toronto's only campground, and human history dating back over 10,000 years, including some of Canada's oldest known Indigenous sites. Since 2011, Parks Canada has been working to nationalize and nearly double the size of the original 'Rouge Park'. In the coming years, Parks Canada is planning to add several new trails, education and orientation centres and improved signage and interpretive panels and displays throughout the park. Once fully established, the park will span 79.1 km² (30.5 square miles). It includes public land in the cities of Toronto, Markham and Pickering and in the township of Uxbridge. The park protects 12% of the Rouge River watershed and small parts of the Petticoat Creek and Duffins Creek watersheds.

APPENDIX B: “CITIES AND BIODIVERSITY OUTLOOK”

Toronto’s interest in Biodiversity is part of larger global initiatives concerned with prioritizing biodiversity conservation in cities. The ‘Cities and Biodiversity Outlook’ (CBO) project is a global analysis of how projected patterns of urban land expansion will impact biodiversity and ecosystems. It stems from Decision X/22 of the UN Convention on Biological Diversity’s COP10 in Nagoya, Japan, 2010 and is a partnership between the UN Convention on Biological Diversity, the Stockholm Resilience Centre (SRC) and Local Governments for Sustainability (ICLEI). The key principles (see Appendix XX) include integration of ecosystem services into urban policy and planning. Rich biodiversity can exist in cities, biodiversity and ecosystem services are critical natural capital.

The CBO sets out 10 key messages:

1. Urbanization is both a challenge and opportunity to manage ecosystem services.
2. Rich Biodiversity can exist in cities.
3. Biodiversity and ecosystem services are critical natural capital.
4. Maintaining functioning ecosystems can significantly enhance human health and well-being.
5. Urban ecosystems services and biodiversity can help contribute to climate change mitigation and adaptation.
6. Increasing the biodiversity of urban food systems can enhance food and nutrition security.
7. Ecosystem services must be integrated in urban policy and planning.
8. Successful management of biodiversity and ecosystem services must be based on multi-scale, multi-sectoral and multi-stakeholders involvement.
9. Cities offer unique opportunities for learning and education about a resilient and sustainable future.
10. Cities have a large potential to generate innovation and government tools and therefore can and must take the lead in sustainable development.





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