REPTILES AND AMPHIBIANS OF TORONTO

A GUIDE TO THEIR REMARKABLE WORLD

• City of Toronto Biodiversity Series •

TORONTO

ROM ROYAL ONTARIO MUSEUM

Live green Toronto

Imagine a Toronto with flourishing natural habitats 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 world of nature, and the variety of plants and animals who share this world. Take pride in a Toronto that aspires to be a world leader in the development of urban initiatives that will be critical to the preservation of our flora and fauna.

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Cover photo: Mandy Karch

A red eft, *Notophthalmus viridescens*. This is the terrestrial life stage of the Eastern Newt (a type of salamander). The red eft develops from the aquatic larval stage and after a few years of living on land will return to the water where it will transform into an adult that is entirely aquatic. The bright red skin of these animals is a warning that they are toxic and that would-be predators should stay away. These remarkable amphibians occur throughout eastern North America and can be found in Toronto's green spaces.

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"Frog Sketch"

"Indeed, in its need for variety and acceptance of randomness, a flourishing natural ecosystem is more like a city than like a plantation. Perhaps it will be the city that reawakens our understanding and appreciation of nature, in all its teeming, unpredictable complexity." – Jane Jacobs

Eastern Red-backed Salamander with eggs
illustration: Wallace Edwards, courtesy of Toronto Zoo Adopt-A-Pond Programme

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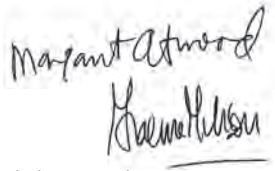
Welcome!

To encourage the celebration of all life on earth, the United Nations declared 2010 to be the Year of Biodiversity. We congratulate the City of Toronto for honouring this special year with this Biodiversity Series celebrating the flora and fauna of our city. Each booklet within the series – written by dedicated volunteers, both amateurs and professionals – offers Torontonians a comprehensive look at a major group of flora and fauna within our city.

We hope that this Biodiversity Series will achieve its main goal: to cultivate a sense of stewardship in Toronto area residents. 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. 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 fresh water, we would die.

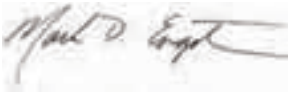
While there are many organizations actively engaged in protecting our city's flora and fauna, the support of ordinary citizens is critical to the conservation of our natural habitats. We hope you'll take a walk in one of our parks and open spaces, lower your blood pressure, look around you, and enjoy the diversity of trees, animals, fishes, birds, flowers, and even fungi that flourish among us.



With best wishes,
Margaret Atwood and
Graeme Gibson
January 2011

Introduction to the Reptiles and Amphibians of Toronto

As a boy, searching for reptiles and amphibians was one of my most enduring connections to nature. *Reptiles and Amphibians of Toronto* is the book I craved as a boy and one I will find absolutely essential as an adult. Designed to quench our thirst for answers to the myriad questions inspired by encounters with our cold-blooded cousins, this book is the essential resource to identify the 23 species that can be found in our urban ecosystems. As stewards of a fragile city landscape, this book also helps us understand our real opportunities to be a positive influence on the mosaic of environments that make up Toronto and to ensure survival of amphibians and reptiles in our own backyards. This book will help you discover a new world beneath your feet (literally, in the case of mole salamanders!) and perhaps change your thinking about how we approach those ecosystems we share with animals and plants. If you want to find snakes, turtles, frogs, toads and salamanders, and learn who they are and what they do, this book is the perfect place to start.



Herpetologically yours,
Dr. Mark D. Engstrom
Deputy Director, Collections and Research, Royal Ontario Museum

City of Toronto Biodiversity Series

Reptiles and Amphibians of Toronto is part of the Biodiversity Series developed by the City of Toronto in honour of the Year of Biodiversity 2010. A number of the non-human residents of Toronto will be profiled in the Series. It is hoped that despite the severe biodiversity loss due to massive urbanization, pollution, invasive species, habitat loss and climate change, the Biodiversity Series will help to re-connect people with the natural world, and raise awareness of the seriousness that biodiversity loss represents and how it affects them directly. The Series will inform residents and visitors of opportunities to appreciate the variety of species inhabiting Toronto and how to help reduce biodiversity loss by making informed individual decisions.

The Turtle with the Sun Under His Chin

Ojibway legend: This story is a First Nation perspective on how the Blanding's Turtle got its yellow chin. This version was shared by Kim Wheatley, Member of Shawanaga First Nations, Co-ordinator of Toronto Zoo Turtle Island Conservation Programme.

This is a Nanabush story. Nanabush is known as a trickster in Anishinaabe communities. He is half spirit and half human and doesn't always make good decisions. Sometimes he is just plain unpredictable!

One day Nanabush was out walking and enjoying all that existed in creation. He admired the beautiful grasses and beautiful flowers. He admired the beautiful trees and birds.

Just then Mishomis, a bright shining light in the sky (the sun) caught his eye and stopped him in his tracks. "Wow" he exclaimed …that is beeeaaauuutiful!

Nanabush was so struck by the beauty of Mishomis that he scooped it out of the sky and took it home and put it in a box. Because he is half spirit and half human he can do these kinds of things …not to mention Nanabush is very unpredictable!

Well the world became a dark, cold place where no food grew and the animals were always cold. This caused a great outcry and all the animals held a big meeting to decide how to fix the problem of having no food and being cold. Of course without sunlight, no food grows and it always gets cold!

It was commonly known by everyone that Nanabush had scooped Mishomis out of the sky and took it home. There were many ideas put forth and much discussion on just how to get Mishomis back.

The biggest and strongest animal volunteered stating "Well I am big and strong …maybe I should go and get Mishomis back" but then …he remembered that Mishomis was at Nanabush's house and Nanabush is very unpredictable so he changed his mind.

Then the fastest exclaimed, "Well I am fast, fast, fast! Maybe I should go," …but then he remembered Mishomis was at Nanabush's house and Nanabush is very unpredictable so he changed his mind.

Well the meeting went on for some time, while more suggestions were put forth, but nothing solid was accomplished. Then a little voice was heard to exclaim, "I will try!"

All the animals looked around and could not locate the source of the little voice. Once again they heard, "I will try!"

As the group scanned all those present they finally looked lower to the ground and spotted a little turtle. The animals looked at the little turtle with incredulous eyes and burst into laughter! Some exclaimed, "What are you talking about? You are not big and strong … you are not even fast, fast, fast …how are you going to rescue Mishomis from Nanabush's house?!

Well, that little turtle was determined to show everyone that he could do it so he shouted again, "I will try!"

So all the animals wished him good luck and off he headed to Nanabush's house. As he neared the house he could hear a very strange sound. Once he crept closer he could hear the sound was snoring! Nanabush was sleeping!

Phewww, the little turtle exclaimed! He knew that it was lucky that Nanabush was sleeping but of course that is what most creatures do when it's dark …they sleep.

He carefully crept up to the house and creaked open the door to the house. It was dark but there was a little light coming from the fireplace. The turtle noticed that Nanabush was a very messy housekeeper. The dirt floor was strewn with rocks, old bones and other items.

The turtle carefully crept into the house after spotting Nanabush sleeping in a chair in the far corner of the room. As he slowly entered the room he heard a loud bang behind him. The door slammed shut…. which woke Nanabush up and he thundered, " WHO is in MY house!!!" Well that poor little turtle shrunk right into his shell and shook with fear. He began to pray …"Please don't see me …please don't see me!"

Well Nanabush's house was so messy he didn't recognize the little turtle amongst all the rubble on the floor and simply mistook him for one of the many rocks strewn on the floor. Nanabush rubbed his eyes, yawned loudly and exclaimed, "Oh …I must have been dreaming." Then he nodded back off to sleep.

That little turtle was so relieved that he quickly decided he didn't have much time and had better find Mishomis in a hurry. Only after he heard Nanabush's loud snoring again did he carefully stretch his neck out of his shell. He took a careful look around the room looking for signs of Mishomis.

Ah ha! In the opposite corner he spotted an enormous box. He thought to himself that has to be where Nanabush hid Mishomis. He promptly headed over to the box. He stretched his long neck out and lifted the lid to peek into the box. Sure enough …inside was Mishomis. The little turtle stretched his mouth wide open and put Mishomis inside. He then clamped his mouth shut so no sunlight could escape and pulled his head out of the box.

Just then the lid of the box slammed shut and woke up Nanabush. "WHO'S in MY house?" thundered Nanabush!

Well that little turtle was shaking in his shell with fear but tucked himself in and waited. Once again Nanabush rubbed his eyes, yawned loudly and exclaimed, "Oh …I must have been dreaming". He then nodded back off to sleep snoring loudly.

The little turtle exhaled with relief at his luck of not being discovered. He knew however that this luck might not continue and decided he better hurry out of the house as fast as he could. He scrambled to the door as fast as his little legs could carry him. As soon as he got to the door he opened his mouth wide and out flew Mishomis, right back up up up into the sky.

That is how sunlight came back to the world!

As a result of carrying that beautiful Mishomis in his mouth, the little turtle received a permanent reminder of his bravery. His chin was forever stained yellow like the colour of Mishomis! So now this little turtle is celebrated as the Turtle with the Sun Under His Chin.

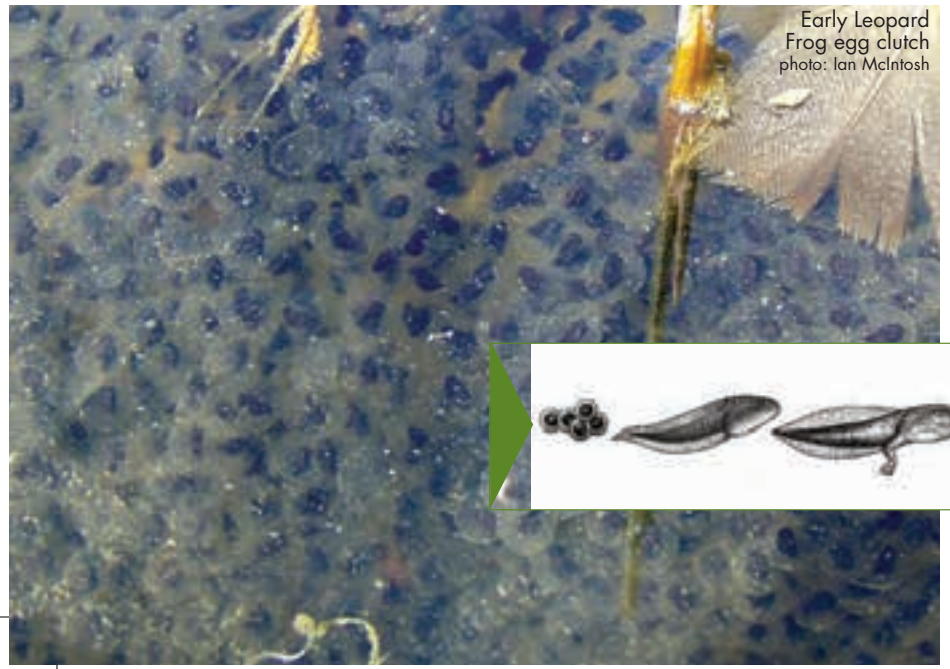
~

Blanding's Turtle
photo: Nicole Richards

Life Stages of Reptiles and Amphibians

As an animal matures to adulthood many species go through developmental stages that have different dietary and habitat needs. This is much like the needs of a new born baby being very different from that of an adult human. Some amphibian species have very different needs at the various stages of development.

Eastern Newt larva
photo: W.A. Crich



Early Leopard Frog egg clutch
photo: Ian McIntosh

Bullfrog Tadpole
photo: Calvin Knaggs

Life stages of the Leopard Frog
illustration: Nina Bunjevac

Most salamanders, frogs and toads have a biphasic life (two different lifestyles) that require very different environments. Most amphibians found in Toronto lay eggs in water that develop into a larval stage that is entirely aquatic such as a tadpole. These larvae have gills (internal or external), are omnivorous eating both plants and animals, and have mouth parts that are more adapted for scraping and nibbling. During metamorphosis amphibians develop a small row of teeth on the upper jaw and in the case of salamanders on the lower jaw too. These new teeth allow them to handle a carnivorous (all meat) diet of insects, snails, other frogs and even small rodents.

As always, there are exceptions. The Eastern Red-backed Salamander lays eggs on land, and the embryos emerge from the egg capsule as a miniature version of the adult with the same ecological requirements as their parents. The only difference is that the newly emerged salamanders must feed on much smaller prey items than the adults. Another exception is the Eastern Newt. While it has an aquatic larval stage, it also has a land-dwelling intermediate stage (red eft) that transforms into another aquatic life stage as an adult. An unusual exception is the Mudpuppy, a salamander that never grows up! They retain the larval gills and are entirely aquatic, but switch to a carnivorous diet.

Did you know... Reptiles and amphibians are ectothermic. Once referred to as "cold blooded," ectotherms take on the temperature of their environment and can even be warmer than you!

Some Toronto reptiles have distinct life stages, such as turtles, which all lay their eggs on land. The sex of the young turtle is dependent upon the temperature at which the eggs are incubated. For most snakes in our city, the female keeps the embryos within her body so that she gives birth to fully formed juveniles (a process known as viviparity). Some species, however, lay eggs (a process known as oviparity). For example, the Milksnake lays 6-15 eggs that take approximately two months to hatch. An intermediate between these two strategies, the Smooth Greensnake, will retain the eggs for a longer period of time, all the while regulating her body temperature so that development is maximized at the time when the eggs are finally laid. Hatching in this species takes place approximately two weeks after the eggs are laid. The reptilian diet from hatchling to adult is largely the same, just smaller portions for younger individuals.


Watersnakes in crevice
photo: Mary Ferguson


Stinkpot (Musk) Turtle eggs
photo: Julia Phillips


Gartersnake with young
photo: W.A. Crich


Painted Turtle hatchling
photo: Scott Gillingwater

Biogeography

The distribution of animals that we see today has been shaped in many ways by the pressures that organisms face over time. These pressures may include biotic factors (other living things) such as predation and competition from other species or other individuals of the same species. They may also include abiotic factors (non-living influences) such as the physical and chemical properties of an environment in the form of climate, geography (mountains, rivers and oceans) and water quality (pH and pollutants). The environment created by these factors is changing all the time.

Over 13,000 years ago, during the last ice age, glaciers played an important part in creating the different land formations that we see today in southern Ontario. The features of the land (drainage and elevation) in conjunction with weather conditions ultimately dictate the habitats and microhabitats that some species rely upon.

We can use our knowledge of what specific habitats a species may require and look at an area and predict what species should be present. If that species is not found, we have to ask why not? Often times we will find that it is another factor exerting its influence, an influence that has grown steadily more harmful over the last 300 years, and that is human impact.

The distribution of a species may be composed of numerous populations. Populations are groups of individuals that have the potential to meet and breed. In other words, there are no barriers to their movement. Where that population falls within the total distribution of a species will have a profound effect on its survival.

The population is always most sensitive to changes along the edge of the distribution. The edge of a population is forced to confront

Ravine
photo: City of Toronto

biotic and abiotic conditions that would not be present in the centre of the species' distribution.

With only a few exceptions, the reptiles and amphibians of Toronto are all near the northern limits of their species' distribution. Climate plays a very important role to limiting the number of species that can survive in Toronto. Very few species of reptiles and amphibians can survive our long winters. Those that do, have modified either

Did you know... At their northern range, amphibians and reptiles go into hiding and slow down their metabolism during the cold season. While not true "hibernators" reptiles and amphibians do "overwinter."

Wetland
photo: TRCA

their overwintering behaviour (burying deep into the mud, below the frost line to avoid freezing) or modified their physiology (body chemistry) and are able to completely freeze during the winter, like an ice cube! Thus, the climate and other impacts humans are having on our ecosystems explain why most of southern Ontario species are at risk or are endangered.

There are working groups at various levels (global, national and regional) that are constantly monitoring the status of a species (assessing the potential to survive). This is why we may see that some species are listed as endangered in Ontario (COSSARO Committee on the Status of Species at Risk in Ontario), but have a reduced or lowered threatened status at the national (COSEWIC Committee on the Status on the Endangered Wildlife in Canada) or global level (IUCN International Union for Conservation of Nature).

Yesterday's Habitats of Toronto

Toronto is fortunate to have river valley systems that sustain a diversity of amphibians and reptiles. Our city's boundaries have been defined by the Humber River to the West, the Rouge River to the East, Lake Ontario to the south and the rise of the Oak Ridges Moraine to the north. To this day we find that the greatest diversity of amphibians and reptiles in the Greater Toronto Area (GTA) has always been associated with these important land formations. When the flora and fauna of Toronto was summarized in the early 1900s, the city was home to 11 species of reptiles and 16 species of amphibians.

As the city of Toronto expanded northward from the lake front, concerns for human health grew and important wetland habitats were filled or drained. Nowhere is this more evident than at the mouth of the Don River and Ashridge's Bay. By the 1880s, even the marshes on Toronto Island had been destroyed by humans. At this time, raw sewage and industrial waste were discharged directly into the Don River and it was thought that these smelly swamps were the source of several diseases.

Southern Ontario supports some of the highest biodiversity in Canada. Prior to the boom of European settlements in the 1800s, the sheer number of amphibians and reptiles would have been striking. Wetlands were abundant as were moist meadows and forested swamps. River valleys provided seasonal floodplain habitats and the pockets of forest and meadows would have provided many east-west corridors so that wildlife could move between river systems. The landscape was dynamic, habitats were self sustaining and Toronto's reptile and amphibian populations benefited from individuals moving in from larger populations outside of the city limits.

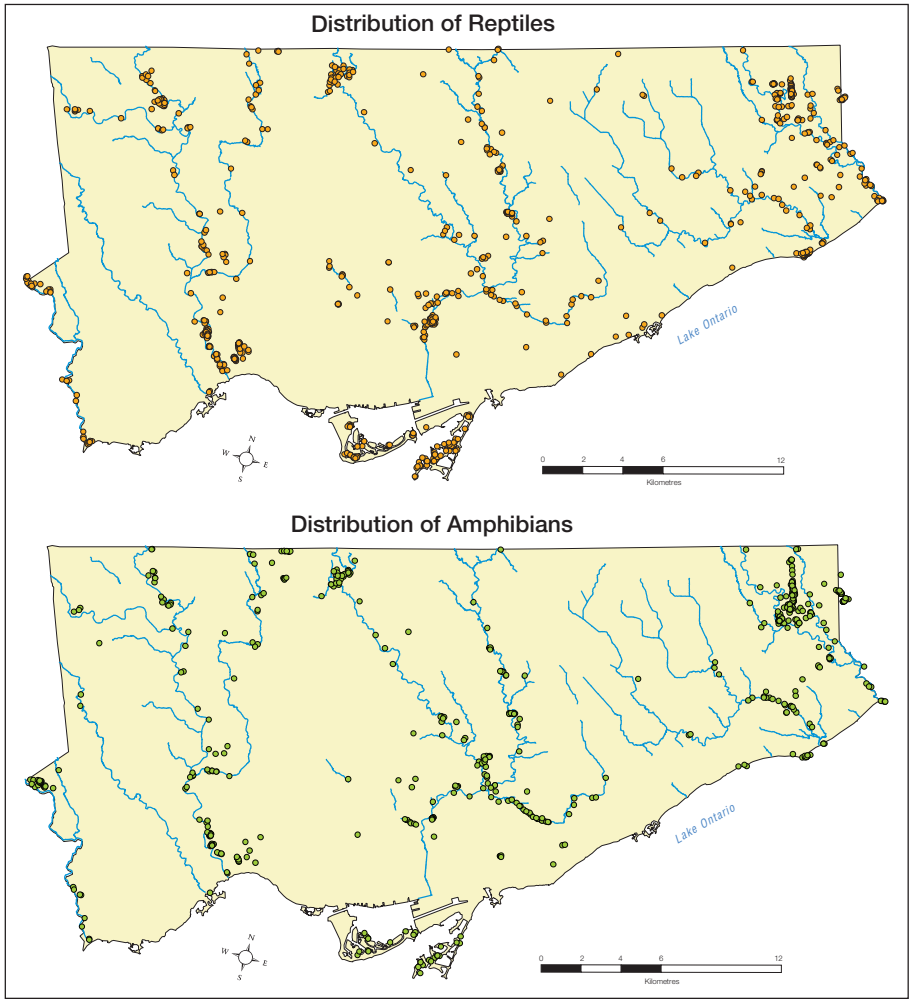
City of Toronto Archives, fonds 1244, item 248

Ashbridge's Bay marsh, early 1900s, once one of the finest freshwater coastal wetlands in eastern North America, was sacrificed in the early 1900s for the creation of the port industrial lands.

Beaver once played an important role in creating wetlands along many of southern Ontario's river systems. This was replaced in part by mills and their mill ponds; there were 40 of these man-made ponds along the Don River alone. As the area within the city limits was slowly transformed for agricultural purposes or urbanized for our comfort, streams were channelled and wood lots cleared and the underbrush removed. An increase in hard surfaces and the fast removal of water to underground sewers led to the loss of temporary wetlands and intermittent streams. As water tables were lowered in the new urban areas, amphibians were less likely to find the early spring pools for breeding and the wet meadows or woodlands that sustained them as well as their prey.

Gray Treefrog
photo: Paul Prior

Not surprisingly, amphibian and reptile populations declined as the wild spaces were destroyed or became more isolated. The original dirt and gravel roads bordered by brush and vegetation provided relatively safe foraging habitat for some of Toronto's reptiles and amphibians. Once the roads were paved and traffic volume and speed increased, roadways became barriers that prevented movement into or around the city. Consequently, in a relatively short span of time many species died off due to the rapid urbanization.



Distribution of Reptiles and Amphibians – Dots on the maps represent records of reptile (above) and amphibian (below) species in Toronto. The number of dots is a direct reflection of the quality of habitat. Note how sightings are clustered in river valleys and ravines.
credit: Based on data from Bob Johnson, Toronto Zoo and Toronto Field Naturalists. Maps prepared by Magda Kula.

Today's Habitats of Toronto

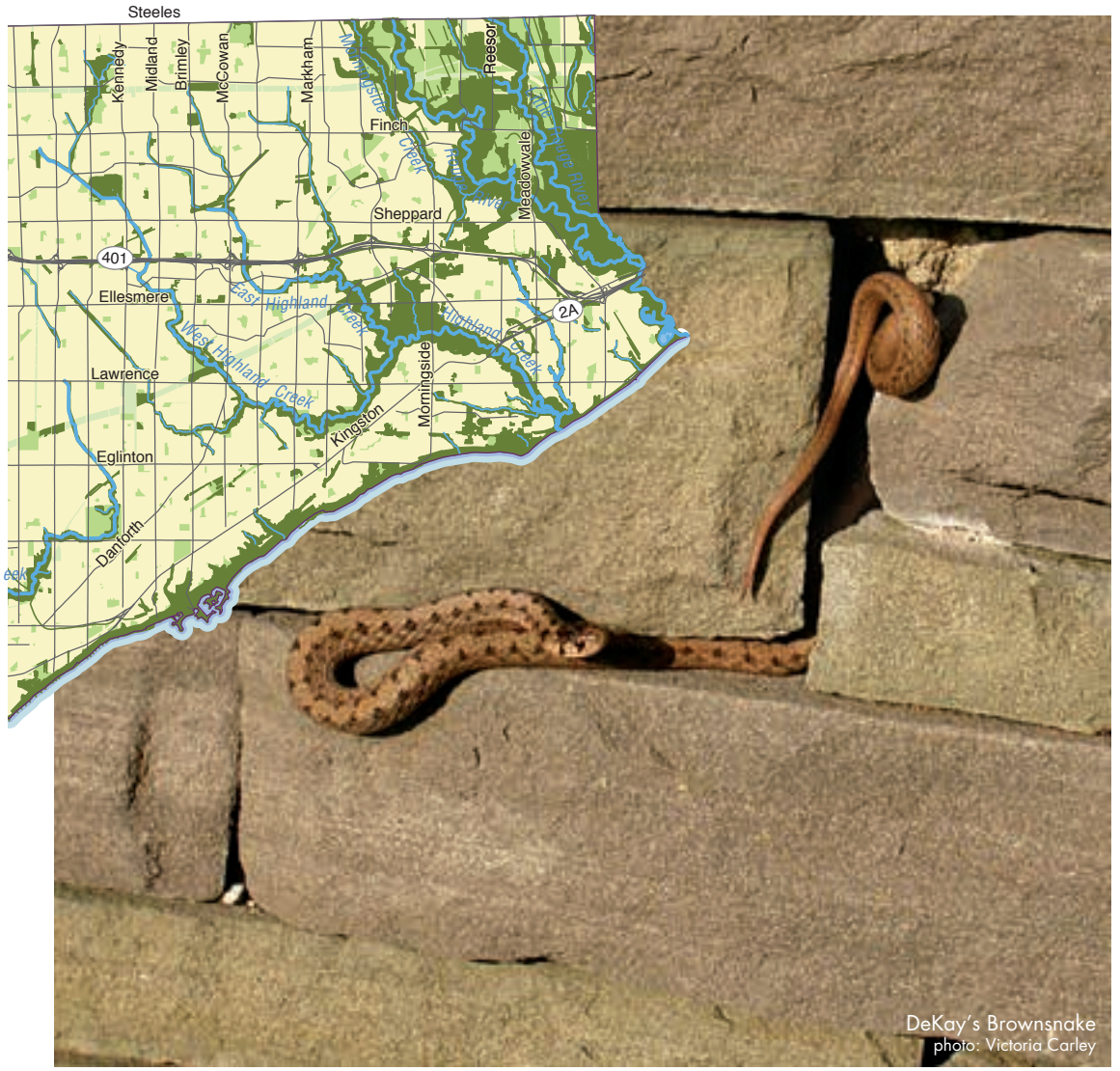
Current populations and trends

Ontario has 45 species of reptiles and amphibians, 24 native species that can be found within the city limits of Toronto, and another four in the surrounding GTA. Today we know that the greatest biodiversity in Toronto occurs along the river valley systems as they serve both as migration corridors from less urbanized regions and refuges within urban areas. Wetlands are the landform most often linked with amphibian and biological hotspots. This is in part due to their biological diversity, associated upland habitats, and the presence of both land and water. Overall, this high quality habitat is what Toronto's reptiles and amphibians require. A recent increase in lakeside wetlands (Leslie Street Spit, Colonel Samuel Smith Park, Bluffer's Park) and many wetland restoration projects has provided not only an increase in overall area of wetlands but also serves to connect important habitats.

The Rouge River valley and nearby lands have on record the highest amphibian and reptile biodiversity in Toronto; a diversity similar to that of less urbanized regions in the surrounding GTA or southern Ontario. This is a reflection of a healthy ecosystem. The preservation and restoration of the ecological communities within the Rouge area may serve as a model for species recovery and habitat restoration for more disturbed parklands in the GTA.

City of Toronto Natural Features

Toronto's many parks, ravines and natural areas provide ample opportunities for viewing amphibians and reptiles. We encourage you to explore.



DeKay's Brownsnake
photo: Victoria Carley

Less sensitive species that may still be found in some of today's severely altered urban areas include the Eastern Red-backed Salamander, Common Gartersnake, Dekay's Brownsnake, American Toad, Green Frog, and Painted and Snapping Turtles.

Species that are either habitat specialists or require high quality habitats (e.g., upland or forested areas that are beside a marsh or wet meadow habitat), are relatively uncommon in Toronto and include: Red-bellied Snake, Milksnake, Smooth Greensnake, Northern Map Turtle, Blanding's Turtle, Eastern Newt, Northern Leopard Frog, Gray Treefrog, and Wood Frog. Surprisingly, these species may be found living close to urban areas as long as the habitats needed to sustain the population are near.

Species that frequently colonize habitats on the edge of Toronto's city landscape include the Bullfrog, Spring Peeper, and Pickerel Frog. Other species found on the periphery of the city include the Northern Watersnake, Spotted Salamander and Mudpuppy. Populations of these species are sustained by individuals migrating into the city from more distant populations. The Western Chorus Frog, once common in Toronto, has recently disappeared much like it has over many regions of southern Ontario and Quebec.

The introduced Red-eared Slider, a species native to the United States and often sold in pet stores and garden centres, has been released into several of Toronto's wetlands and is able to survive our moderated urban winter.

Threats Posed by Urbanization

Habitat loss, fragmentation and degradation

Urban development consumes, fragments and degrades natural habitats. Habitat loss is a key threat to the persistence of wildlife populations. More than 75% of Ontario's wetland habitat has been lost over the past 100 years. Wildlife is at risk as human populations encroach on the remaining habitat resulting in more interactions on roads, in backyards and other urban spaces. These interactions are usually at the expense of the wildlife. For example, snakes foraging in grass are often killed by lawn mowers.

Habitat fragmentation is detrimental because wildlife may be denied access to resources such as mates or critical habitats for breeding, feeding or overwintering. Fragmentation also has the potential to isolate small numbers of individuals; isolated populations can suffer from low genetic variation that can leave individuals more susceptible to disease and environmental fluctuations. Turtles have suffered some of the greatest losses due to habitat fragmentation because some of these species require large home ranges to find suitable feeding and nesting habitats.

Habitat degradation is caused by pollution, invasive species and over-use (e.g. development, recreation, change in species composition due to planting/harvesting and/or translocation of wildlife). Wildlife inhabiting degraded habitat have poorer overall health and sensitive species, such as amphibians, may develop abnormalities, disease and infertility.

Illegal roadside dumping
photo: Mandy Karch

Destruction of wildlife habitat for new housing development
photo: Mandy Karch

"Behold the turtle. He makes progress only when he sticks his neck out."
– James Bryant Conant

Roads

Roads are a source of direct mortality caused by fatal collisions between wildlife and vehicles. Roads fragment habitat which can make it difficult or impossible to move between spring/summer habitat and overwintering sites. Unlike mammals that scurry when frightened, reptiles and amphibians cannot readily avoid roads or vehicles, making them particularly vulnerable. The risk is elevated for reptiles such as snakes that bask on the warm surface and turtles nesting on the gravel shoulder of roads. In the latter case, even if the adult survives nesting beside a road, hatchlings may have to negotiate the road and traffic upon emergence from the nest. The risk posed by roads increases for amphibians on warm, wet nights following dry-spells when mass numbers of frogs move and are killed while crossing in heavy traffic areas. Roads also pose a threat to reptiles and amphibians due to various types of pollution. Vibrations, excessive heat, light, noise and chemical pollution are all detrimental to reptiles and amphibians. For example, calling frogs are negatively impacted by traffic noise. More energy is spent if a frog has to call more often and louder to overcome noise pollution generated by roads and trains. The chemical pollution found in road run-off is particularly dangerous as the oil, salt and waste from many roads still drains directly into waterways such as the Don River and degrades wildlife health and habitat.

Close call for a Painted Turtle
photo: Paul Prior

Dead on road, Common Gartersnake

Live on road, Painted Turtle
photos: Mandy Karch

Persecution

Humans have been known to perform terrible acts of cruelty on reptiles and amphibians. These animals are sometimes intentionally run over (by car or bike), stepped on, abused, destroyed, taken as pets, or tortured before being eaten. This kind of treatment is inhumane and illegal.

Reptiles and amphibians are so different from us. Hairless, scaly, slimy! What are people to think of these creatures? From biblical times reptiles and amphibians have been portrayed as evil or disgusting. Whether it's a snake tempting Eve in the Garden of Eden, or frogs sent *en masse* as a plague, reptiles and amphibians have received a bad reputation that has led to fear and misunderstanding of these remarkable animals. Unfortunately, much of humanity either fears, is wary of, or even hates these beautiful creatures. However, the truth is they are a beneficial and integral part of the ecosystem.

In Toronto there are no naturally occurring venomous snakes. Snakes keep our gardens healthy by eating slugs and insects and they control rodent populations. Turtles help keep our waterways clean of rotting material. Frogs eat insects, fill the air with their song and have been used as indicators of the health of the environment. Salamanders play an important role in continuing the energy flow between aquatic and terrestrial ecosystems (e.g., feeding on aquatic invertebrates and then later becoming prey for terrestrial predators).

These animals are a vital part of our natural environment. They should not be targeted for cruelty, science projects or play. Please respect and teach others to respect all wildlife and treasure every encounter you have with Toronto's amazing reptiles and amphibians. They are unique and facinating creatures, often rare in our city limits – an experience to truly enjoy!

Turtle poaching. Turtles taken from the wild to be sold as pets illegally.
photo: Wildlife Enforcement Division, Environment Canada

Skull of Snapping Turtle killed by a bullet
photo: Scott Gillingwater

Subsidized predator populations

Reptiles and amphibians are natural prey items for predators such as raccoons, skunks, foxes and many bird species. In nature, populations of prey species evolve to withstand the pressures of natural predation. However, in urban environments where trash provides an additional food source for the predator populations (i.e., a subsidy), reptile and amphibian populations cannot survive the unnaturally high level of predation.

Certain animals have long been associated with and adapted to benefit from human habitation; in North America there are several native species that thrive in urban settings. Unfortunately, these species that have adapted – also known as "subsidized predators" (e.g., raccoons, skunks, chipmunks, crows, not to mention the domestic cat!) – will prey on species such as frogs and snakes, that do not benefit from the same "subsidies."

Under natural conditions (i.e. where no "subsidies" are available) predator and prey populations exist in a self-regulating balance. As predators force the numbers in the prey population down due to hunting, the predator population will eventually decline in numbers from lack of food. This reduction in hunting pressure allows the prey population to grow once again supporting a healthy predator population. This is a continually repeating cycle.

When predators are "subsidized" their populations are maintained at an artificially high level that is not responsive to the natural fluctuations in prey populations. Under these circumstances, prey populations cannot withstand the volume of predation and will eventually face local extinctions, a process known as extirpation. Add together enough local extinctions and you have the potential for species extinction!

The main culprit, as far as amphibians and reptiles are concerned is the raccoon. This predator has always had reptiles and amphibians on its menu – especially turtle eggs – but now raccoons are heavily subsidized in all human landscapes (urban and rural) by the enormous amount of garbage and food waste produced by people.

Help control subsidized predator populations
(e.g. raccoons, skunks, coyotes, foxes) with these helpful tips:

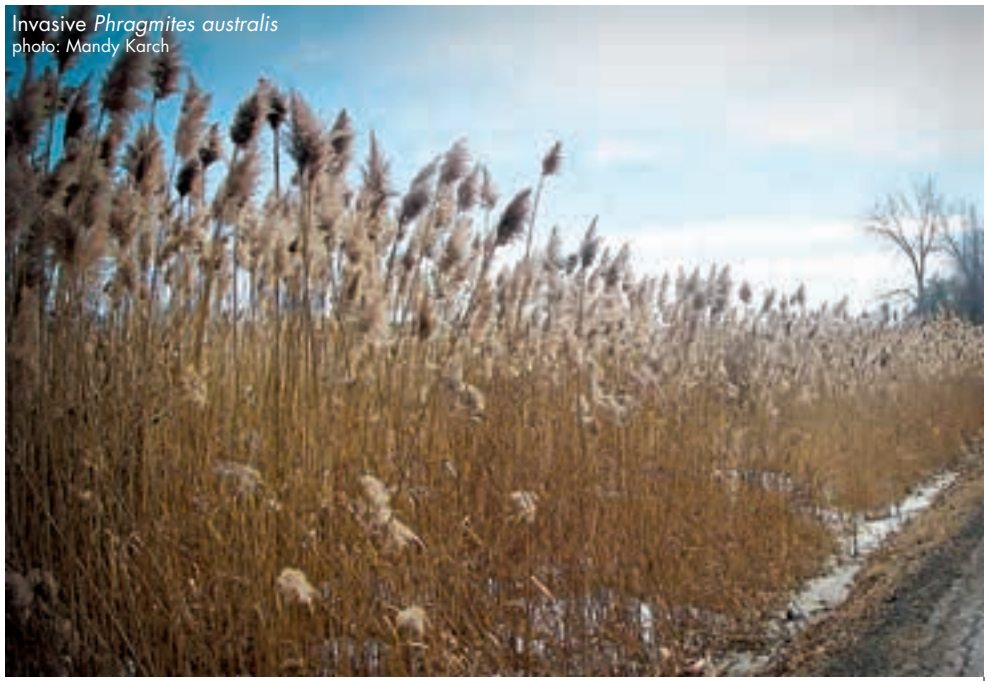
- Put your garbage and green bin out the day of collection.
- Secure your garbage and green bin containers against wildlife.
- Ensure that bird feeders are not inadvertently feeding these problematic species.
- Keep cats indoors

Raccoon eating Snapping Turtle eggs; note discarded eggs in background.
photo: Julia Phillips

Non-native species

Amphibians and reptiles face many perils in urban areas. One that may be overlooked is the impact non-native species have on the environment. Native species are species that occur naturally in an area. Toronto's native plants and animals have evolved in the presence of one another and as such, have complementary relationships in a given ecosystem (such as predators and prey). These relationships often form complex webs that scientists have yet to fully comprehend. Non-native species are those species that are introduced by people, sometimes inadvertently, to a region that is outside of their natural range. These plants, animals, or other organisms may wreak havoc on the natural balance of existing ecosystems. For example, non-native plants may lack natural enemies allowing them to multiply unchecked and crowd out native plants, potentially causing native species to disappear. Plants are the building blocks of healthy wetlands. They provide a valuable food source to many reptiles and amphibians. They also serve to filter and oxygenate the water, something that is essential for aquatic wildlife. The greater the diversity of aquatic plants in a wetland, the greater the diversity of animals that can be supported. There are a number of non-native aquatic plants that have proven to be problematic for Toronto's wetlands and aquatic habitats. The non-native European frog-bit *(Hydrocharis morsus-ranae)* can be found in many wetlands in southern Ontario. This plant alters the ecosystem in several ways. It forms dense mats that decrease the amount of light reaching the water underneath. Changing light levels can affect plant photosynthesis causing native plants to die. In late fall when these plants die *en masse* the process of decomposing uses up more oxygen than is produced and water can become anoxic (meaning "without oxygen"), something that is detrimental to most plants and animals. Other invasive plants that you can find clogging Toronto wetlands include the common reed *(Phragmites australis)* and purple loosestrife *(Lythrum salicaria)*. These plants have negatively changed the plant composition of many wetlands and in turn, adversely affected the amphibians and reptiles that inhabit them.

Purple loosestrife
photo: Nicole Richards



Invasive *Phragmites australis*
photo: Mandy Karch

There are also problematic animals that have found their way into Toronto wetlands through human action. These include the Common Carp *(Cyprinus carpio)*, a fish that is so commonplace that some Torontonians may not realize that it should not be here, and the Red-eared Slider *(Trachemys scripta elegans)*, a turtle species native to the United States often sold as pets in Canada.

Common Carp were introduced to North America from Europe and Asia in the 1870s. These large bottom-feeders uproot submerged vegetation as they look for food, including amphibian eggs, killing many aquatic plants. Their spawning behaviour is also destructive as they thrash amidst in the shallows around flooded vegetation. The result is cloudy water that lacks vegetation, an environment that is undesirable for amphibians and reptiles.

Red-eared Sliders have become a more recent problem in Toronto, where unwanted pet Sliders can be found in many ponds around the city. These aquarium cast-offs compete directly with native turtle species for habitat. Furthermore, native turtles run the risk of being exposed to foreign diseases by these non-native species.

Red-eared Slider *(Trachemys scripta elegans)*
Did you know?

Red-eared Sliders, the turtle species most commonly sold in pet stores across Ontario, are not native to Canada and can live for over 40 years in captivity! This pond turtle is actually native to the south-central/south-eastern United States and only occurs in Toronto wetlands because they are abandoned by pet owners.

It can be difficult to tell the Red-eared Slider from the native Painted Turtle. While the name of the Red-eared Slider originates from the red or orange stripe behind its eyes, this characteristic is not always reliable as the colour can fade in adults. Generally, Red-eared Sliders have a slight crest on their upper shell (carapace), while the carapace of the Painted Turtle is smooth. Painted Turtles have red bars or crescents on the perimeter of their carapace, something that is not present on Red-eared Sliders.


Red-eared Slider
photo: Scott Gillingwater


Painted Turtle
photo: Nicole Richards

Never release Red-eared Sliders into your local wetland.

Not only do they compete for habitat and food, they spread disease to our native species.

It is best if you can continue to care for your pet turtle, but if that is no longer possible, there are options:

Rescue organizations that find homes for pet turtles:
There are organizations dedicated to the rescue, rehabilitation and relocation of pet turtles and other small reptiles in southern Ontario. In an attempt to keep pet turtles from being released into the wild, these organizations try to find homes for them:

- **Little RES Q:** Little RES Q has 10 drop-off and adoption locations throughout southern Ontario, including one in the GTA. To learn more visit www.littleresq.net or email inquiries@littleresq.net
- **TurtleHaven:** TurtleHaven is located in Kitchener, Ontario. To inquire about unwanted pet turtles and tortoises visit www.turtlehaven.ca or call 519-745-4334

Extirpated Species

The alteration of the Toronto landscape has meant the decline of many incredible species of reptiles and amphibians. For some species, this changing world has caused them to disappear from Toronto. When a species becomes extinct from a localized area, this is called extirpation. Here are a few of the amazing reptiles and amphibians that, unfortunately, no longer call Toronto home. With the creation of new habitat for amphibians and reptiles in Toronto and protection of the existing habitats, we can help make it possible for these species to find refuge in our city again.

Eastern Hog-nosed Snake *(Heterodon platirhinos)*

COSEWIC Status: Threatened, COSSARO Status: Threatened

The Eastern Hog-nosed Snake has a repertoire of behaviours to deter would-be predators. Initially, it will rear back and flatten its neck and even strike, making it appear more like a cobra than any other snake from Ontario. This is a bluff, since the Hog-nosed Snake is not venomous. If this isn't enough to dissuade the harasser, it moves to a more dramatic approach – playing dead! This snake will turn over, and extrude its tongue, trying to convince a would-be attacker to move on to fresher prey. The Eastern Hog-nosed Snake is a thick-bodied snake that is most easily identified by its upturned snout, for which it is named. This feature is beneficial for digging in the sandy soils that it likes to inhabit.

Eastern Ribbonsnake *(Thamnophis sauritus)*

COSEWIC Status: Threatened, COSSARO Status: Special Concern

The Eastern Ribbonsnake is a fairly common snake in other parts of Ontario. It is a sleek snake whose bright yellow stripes might make you think you've seen a Common Gartersnake. It is most easily distinguished from the Gartersnake by a distinct spot in front of the eye. The Ribbonsnake is a live bearer, producing young with the same colour pattern as adults. Unfortunately, Toronto's limited marshes, bogs and swamps, the desired habitat of the Eastern Ribbonsnake, have meant that this docile species is no longer found in the city.

Blue-spotted Salamander *(Ambystoma laterale)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

This large salamander is aptly named for the blue spots along its sides and sometimes the back of its body. This secretive animal used to be found hiding under rocks and logs in the forests that once covered Toronto, and it would have used woodland ponds to breed. Both aquatic larvae and adults are carnivorous, consuming a variety of

Eastern Hog-nosed Snake
photo: Mandy Karch

Eastern Ribbonsnake
photo: Joe Crowley

Blue-spotted Salamander
photo: John Mitchell

invertebrates. In fact, the Blue-spotted larvae consume mosquito larvae as part of their diet. The Blue-spotted Salamander is one of a number of *Ambystoma* that are able to breed with another species to produce hybrid young.

Spiny Softshell Turtle *(Apalone spinifera)*

COSEWIC Status: Threatened, COSSARO Status: Threatened

The Spiny Softshell is unlike any other turtle in Ontario. Its name softshell, refers to the relatively flat, leathery, pancake-like carapace (upper shell). It is not only the shell that sets this turtle apart it has a very long neck and a distinctly long tubular snout that allows it to breathe while mostly submerged. This turtle is highly aquatic, found in large rivers and lakes. Habitat loss due to shoreline development is likely an important factor in the demise of this interesting species from the Toronto waterfront.

Western Chorus Frog *(Pseudacris triseriata)*

COSEWIC Status: Vulnerable, COSSARO Status: Endangered

The Western Chorus Frog is widely distributed throughout southern Ontario and beyond, but is absent from Toronto. This tiny frog is light brown to grey and is most easily identified by three dark lines that run along its back (although this can vary) and a white stripe along the upper lip. These frogs are more often heard than seen and their call can be described as a thumb running quickly along the teeth of a comb. Preferring moist woods and meadow habitat, this species has disappeared because of habitat distruction. Because there are healthy populations in close proximity to our jurisdiction, this is one extirpated species that stands a good chance of returning if we continue to create and protect naturalized areas in the city.

Spotted Turtle *(Clemmys guttata)*

COSEWIC Status: Vulnerable, COSSARO Status: Endangered

The Spotted Turtle is a small turtle. It is easily identified by the bright yellow spots, to which it owes its name, found on its smooth black carapace. The plastron (or bottom shell) is also bright yellow or orange with a black spot on each scute (or plate). The Spotted Turtle is distributed throughout southern Ontario but in limited numbers and in isolated populations. This turtle frequents shallow marshes and bogs, so it is of little surprise that this species is no longer found in such an urban city. Unfortunately, the cute, colourful Spotted Turtle is prized for the pet trade, so poaching is an additional factor contributing to the scarcity of this species.

Spiny Softshell Turtle
photo: Scott Gillingwater

Western Chorus Frog
photo: Chris Law

Spotted Turtle
photo: Joe Crowley

Reptiles of Toronto: Turtles

Turtles are an important part of our urban community. Never noticed them? Not surprising, given that they spend approximately seven consecutive months at the bottom of rivers, ponds and marshes during our cold season. Indeed, these amazing animals spend months on end in cold, dark, mucky places living in the absence of oxygen. Imagine, these air-breathing reptiles surviving such extreme conditions. During the overwintering period a turtle's metabolism drops approximately 90% and the heart beats only about once every five minutes. Incredibly, turtles have been seen moving under the ice. Did you know, that if a turtle needs oxygen and is unable to surface because of ice-cover they can take water in through their cloaca (the common vent in the tail for urination, defecation and reproduction) and extract oxygen through the surrounding inner membrane? It's true! Turtles can breathe through their bum if they really have to!

Turtles perform a number of fascinating and functional roles in our ecosystems. Hatchlings are an important part of the food web and adults help keep our waterways clean by eating decomposing matter. The most recognizable feature of a turtle is the hard round shell. The shell is part of the skeleton and the big bony plates of the back shell (carapace) are fused to the vertebrae and ribs of the animal which means that turtles cannot leave their shell. The lower shell (plastron) is attached to the carapace by the bridge on either side of the body. The bony plates of the shell are covered with keratin (the same material of which human hair and finger nails are made) and make up the scutes or scales of the shell.

Turtles are wonderful members of our diverse ecosystems and communities. Take a moment to meet Toronto's turtles.

Snapping Turtle
photo: Mandy Karch

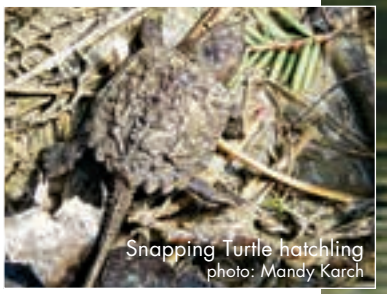
Toronto's (un)Official Reptile: Snapping Turtle *(Chelydra serpentina)*

COSEWIC Status: Special Concern, COSSARO Status: Special Concern

The Snapping Turtle's physiology and anatomy have remained largely unchanged since the prehistoric era. It is a majestic, ancient-looking creature that has inhabited the streams, rivers and wetland areas of Toronto since long before humans arrived. It is the largest freshwater turtle in Canada; it can grow to weigh more than 32 kg (70 lbs); live to be over 100 years old; and females typically lay 20-40 eggs at one time (clutch). Long-time residents living near waterways are likely familiar with the sight of this grey-brown, algae-covered, spiky-tailed reptile floating gently to the water's surface on a still, calm morning to bask in the heat of the sun. Once considered common, the Snapping Turtle has declined in recent years in Toronto due to a combination of life history traits (e.g. late sexual maturity, low reproductive success) that make populations vulnerable to widespread threats such as human persecution, illegal harvest and road mortality.

Due to its generally dinosaur-like appearance and unwarranted reputation as a vicious, limb-chomping reptile, the Snapping Turtle has suffered tremendously at the hands of uninformed humans for centuries. Photographs of tormented and tortured turtles nailed to trees or picnic tables, or ancient adults purposefully run over by ATVs and cars send a disturbing message to us about human capacity for misunderstanding and cruelty. The Snapping Turtle's reputation precedes it; it is frequently misevaluated as a twig-snapping, toe-biting, duckling-eating swamp monster. In reality, Snapping Turtles prefer to swim away from humans while in the water, and are only defensive on land when they feel threatened. Because the Snapping Turtle has a reduced plastron that prevents it from pulling itself entirely inside its shell, it does not have the same protection from predators that other turtles have. It therefore relies on its powerful jaws to defend itself while on land, where it is slow and more vulnerable.

Snapping Turtle basking on a rock
photo: Don Scallen



Snapping Turtle hatchling
photo: Mandy Karch

Snapping Turtle
photo: Sajneet Sodhi

Painted Turtle *(Chrysemys picta)*

COSEWIC Status: Not at Risk, COSSARO Status: Not at Risk

The Painted Turtle, aptly named for the beautiful colours that adorn its shell, is one of the most familiar and recognizable turtle species in Toronto. Although two sub-species of Painted Turtle exist in Ontario, only one sub-species lives in the greater Toronto area; the Midland Painted Turtle *(Chrysemys picta marginata)*. Ponds, marshes, lakes, creeks and oxbows with soft bottoms and an abundance of aquatic vegetation are preferred habitat for this species. The Painted Turtle is relatively common, even in urban environments, and is easily identifiable. The smooth upper shell is olive to brownish-grey or black in colour, and the rim of the shell is decorated with a fine network of red-orange markings. Yellow and red lines accent the skin of the head, legs and tail. Females generally grow to be larger than males, averaging 11 – 14 cm from the front of the carapace to the back. Males have longer claws on their front feet than females. The males use the backs of their long nails to stroke the female's chin as they swim above her and move around her during underwater courting rituals. Mating typically occurs between March and mid-June, and females nest from May to mid-July, depositing 3-14 white eggs into a flask-shaped nest they've dug with their hind feet in the soil.

Painted Turtle hatchling
photo: Nicole Richards

Painted Turtles are often seen basking in large groups on logs, rocks or patches of vegetation. These turtles are not easily confused with any other species that is native to Ontario; however, pet Red-eared Sliders that have been released into local wetlands are sometimes mistaken for Painted Turtles. The Painted Turtle is the only native turtle species in Ontario that is not considered by the federal or provincial wildlife authorities to be at risk of extirpation, although it is subject to many of the same threats that other turtles face. These omnivorous turtles can live to more than 40 years old in wild spaces, consuming a variety of foods such as insects, algae, duckweed, small fish, frogs and crustaceans. Great places to look for Painted Turtles include shallow, slow-moving wetlands in and around the Rouge, Humber and Don Rivers.

Painted Turtle basking
photo: Don Scallen

Northern Map Turtle *(Graptemys geographica)*

COSEWIC Status: Special Concern, COSSARO Status: Special Concern

A large beauty in Toronto's waters, the Northern Map Turtle is a sight to behold basking along streams and riverbanks in the GTA, or swimming beside the shores of Lake Ontario. Map Turtles are incredibly ornate creatures. Their name refers to the networks of curving yellow lines that adorn their green-brown shell and spill over onto the skin of their head and limbs; markings that look like the relief lines on a topographic map. The upper shell has a ridge down the length of the spine and serrations at the hind end of the carapace to reduce resistance in swift waters. Similar to other turtles, the feet are highly webbed for swimming and permit fast escape from predators. Map Turtles are avid baskers and can often be found sharing space to soak up sunshine on fallen logs and sandbars with Painted Turtles. They are primarily carnivorous, eating insects, molluscs, crustaceans and fish, but do occasionally feed on aquatic vegetation.

Northern Map Turtle
photo: Calvin Knaggs

Female Northern Map Turtles have large, powerful jaws that can easily crush the calcium-rich shells of molluscs, on which they tend to specialize. Females grow substantially larger than males, and take almost twice as long to reach sexual maturity (at about 12 years of age). Mating occurs in late fall and early spring and females travel large distances between May and early July to lay 10-20 white, oval-shaped eggs on preferred stream banks and river sandbars. Hatchlings can emerge from the nest in summer or early fall, or stay in the nest chamber over the winter months and surface the following spring. Map Turtles overwinter under water and can occasionally be seen moving underneath the ice! One of the biggest threats to Map Turtles is injury caused by recreational boating; turtles swimming and basking near the water's surface are often cut and damaged by the motor blades of speed boats passing through narrow river channels.

Northern Map Turtle
photo: Nicole Richards

Stinkpot (Eastern Musk) Turtle *(Sternotherus odoratus)*

COSEWIC Status: Threatened, COSSARO Status: Threatened

The skunks of the turtle world, Stinkpot Turtles are named as such because they release a foul-smelling liquid (or musk) from hind-quarter glands when handled, a defensive strategy to deter predators from mistaking them for a tasty treat. Also commonly referred to as the Musk Turtle, Stinkpots are Toronto's smallest and most elusive turtle species. They typically measure no more than 13 cm (5 in) in length and their nocturnal behaviour and preference for hanging out under the caverns of vegetation mats and at the muddy bottoms of shallow waterways make them one of the most difficult turtle species to spot. Distinguished by the presence of two prominent yellow or light coloured stripes on either side of the head and neck, a rounded, pig-like nose, barbels (fleshy protrusions) on the chin and throat, a high-domed gray-brown to black carapace and a yellow to brown plastron, Stinkpots are hard to mistake for any other type of turtle (aside, perhaps, from a young Snapping Turtle). Males have longer, thicker tails than females but otherwise the sexes look very similar.

Stinkpot Turtle
photo: Scott Gillingwater

Stinkpot Turtle
photo: Mandy Karch

Both males and females mature around 3-4 years of age and courtship rituals in northern climates tend to occur in April and May. Female Stinkpots lay 1-5 eggs in a very shallow nest under leaf litter or a small scraping of soil in late spring and early summer, and females often choose to nest in the exact location where other nests already exist. Hatchlings emerge in late summer and early fall and head to the nearest water body.

Stinkpots have exceptional auditory and visual senses, and can even see in colour! They can stay submerged under water for long periods of time (typically not more than 20 minutes, but in some cases up to five days!) and usually do not bask out of water like other turtles. They can be found in almost any water body with a slow current and a soft bottom. Stinkpot Turtles live in a diversity of habitats including rivers, streams, lakes, ponds, and swamps. They are unusually good climbers and occasionally may be seen basking in tree limbs overhanging the water during the early months of spring. Since this turtle usually stays under water, this is the best chance to see one. They are the least mobile of all Toronto's turtles, usually remaining in the same localized area for most of their adult life. Stinkpots have a varied diet, eating both plants and animals that they find by rooting around with their snout along the soft floor of calm waterbodies. Habitat loss and boat propeller injuries pose severe threats for Stinkpot Turtle populations.

Blanding's Turtle *(Emydoidea blandingii)*

COSEWIC Status: Threatened, COSSARO Status: Threatened

One of the rarest and most beloved turtles in Toronto, the Blanding's Turtle can occasionally be spotted by lucky observers in the early months of spring while basking on exposed rocks and vegetation, or at the surface of the water in wetlands throughout Toronto's larger, more remote parks and green spaces. Known by Anishinaabe people as "the turtle with the sun under its chin," the Blanding's Turtle is best recognized by its bright yellow chin and throat, as well as its characteristic bulging eyes, a high-domed, yellow-flecked shell and an upturned mouth that makes it seem as though the turtle is always smiling. It has a "hinged" plastron that offers special protection from predators because the turtle can raise its bottom shell up towards the top shell after withdrawing the head and limbs. A shy and secretive turtle, this species is especially sensitive to human disturbance, and prefers quiet areas away from pedestrian traffic and noise. Blanding's turtles are late bloomers, with males reaching sexual maturity at age 12 and females at age 18. Individuals rival humans for longevity and can live to be over 80 years old! Females nest in late May to early July, laying an average of 10-15 eggs each year. As is the case for all of Toronto's turtles, Blanding's Turtles have temperature dependent sex determination, which means that the incubation temperature of the nest cavity dictates the sex of the embryos. This species generally prefers productive, shallow-water habitats with firm organic bottoms and abundant aquatic vegetation, including lakes, ponds, marshes, creeks and sloughs. It eats an omnivorous diet which includes items such as crayfish, insect larvae, leeches, small fish, frogs, algae and duckweed. The Blanding's Turtle is perhaps more vulnerable to habitat degradation and destruction than other turtle species because it uses a wide variety of wetlands and habitat types throughout its life time. Blanding's Turtles also tend to move great distances (one turtle has been reported to travel more than 6 km in one day!) in search of suitable summer ponds and wintering sites. Consequently, it is important that this species has safe habitat corridors through which to travel – a dire problem in highly fragmented landscapes such as the GTA. A walk in High Park or the Rouge Wetlands on a sunny day in May might lead you to some of the few remaining havens for Blanding's turtles in our urban landscape.

Blanding's Turtle
photo: Ann Gray

Blanding's Turtle
photo: Scott Gillingwater

Reptiles of Toronto: Snakes

Sssnakes! What glorious members of our urban ecosystem. Typically snakes are secretive. They often stay hidden in the cool spaces between rocks on a warm summer's day or out of sight as they hunt in the tall grass of a meadow. Sometimes though, when the air is cool and the sun is high, snakes seek the warmth and come out to bask on rocks, paved paths or roads. This may lead to great viewing opportunities, but it can also be dangerous as it can result in casualties due to pedestrians, bicycles and cars.

Snakes, contrary to popular belief, have very dry skin. In fact, people are slimy compared to snakes because our skin produces sweat and oil. Snakes are scaly. They even have a clear protective scale over each eye instead of eyelids. You'll never catch a snake blinking and when they grow and it's time for them to shed their skin, the scale over the eye will appear cloudy. At this time the snake is very vulnerable due to its limited vision. Snakes sense their environment in interesting ways. They use that long bifurcated (forked) tongue to taste, touch and smell their surroundings and while they lack external ears, snakes can sense and react to vibrations.

No native snake inhabiting Toronto is venomous. Snakes in our city are beneficial because they feed mostly on rodents, insects, worms, slugs and snails in the garden.

In the winter, snakes seek shelter from the snow and ice below the frost line. Their overwintering sites (hibernacula) are accessed from rocky outcrops or through cracks in basement foundations. Snakes do not cause any harm, but if you have accessible crevices in your home, you may inadvertently be inviting snakes in to share your dwelling. Don't be alarmed, just gently remove the snake when the weather is right, find and seal the access hole and you will be enjoying snakes on the outside once again.

There are no venomous snakes native to Toronto.

Girl with Ring-necked Snake
photo: Scott Gillingwater

Never move a snake outside in winter or when weather is below 12°C. Learn about the snakes that share our city, and the next time you are lucky enough to see one, pause and take a moment to enjoy the colour, movement and beauty of the animal.


Juvenile Hog-nosed Snake
photo: Nicole Richards

How snakes are perceived

Unfortunately, snakes have a history of being misunderstood and mistreated. Dating back to the creation stories of some of today's religions, snakes have been cast as villains. In reality, Toronto's snakes are not evil, not aggressive and not dangerous at all. They merely mind their own business in Toronto's parks and valleys and eat a lot of animals that most people consider "pests."

Sadly, the dislike of snakes is so strong that many people in Toronto respond to seeing a snake by screaming, running or sometimes even killing it. Snakes have tiny pin-like teeth used mostly for gripping prey and guiding it into the throat. They will not bite unless you try to handle them; they think of you as a predator and that they are about to be eaten. Biting is a last resort. A bite from one of Toronto's six native snake species will not cause significant injury because their teeth are tiny and they don't carry diseases that can be transferred to humans, cats or dogs. Remember there are no venomous snakes that are native to Toronto.

If you see a snake in Toronto you should consider yourself lucky! Our destructive actions have rendered most snakes absent or nearly absent from our beautiful city. Take care of those that remain as they play an important role in Toronto's urban ecosystem.


Common Gartersnake
photo: Mandy Karch

Common Gartersnake *(Thamnophis sirtalis)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

You are walking along a grassy trail and you hear a rustle in the grass near your feet. You look down and there it is – Toronto's most common reptile – the Common Gartersnake. You can also see them in wetlands, in the forest and even in your garden. This beautiful animal is present in most natural ecosystems and even some constructed ones. Gartersnakes are active hunters. They sneak around until they find the frog, salamander, earthworm, small fish or mouse they desire and chase it down and eat it. They don't sit and wait for their meal like larger bodied snakes. Their black body with sleek yellow stripes helps them camouflage well in the grass and we usually notice them if they move away from our approaching feet.

On a warm day in early April, Gartersnakes emerge from their communal dens and form breeding aggregations. Several males will wrap around a single female in a competition to fertilize her eggs. It is not unusual to see balls of 8 or more snakes at this time of year.

Gartersnakes give birth to 10-30 live young that are 13-23 cm (5-9 in) long each August. This means they are one of several species of snakes in Ontario that do not lay eggs but instead incubate and hatch eggs inside their bodies before giving birth! This allows the mother to both protect her young and assist in their development as she seeks warm sunny areas. Keeping her eggs warmer for longer periods of time means the young will be born early enough so that they can spend more time eating and growing before it is time to find shelter to protect against the cold, harsh Toronto winter. In order to survive the winter, Gartersnakes find holes in the ground or crevices in structures that extend below the frost line, and could be up to two metres deep. Gartersnakes will overwinter in communal underground sites called hibernacula. In Toronto this may be groups of a few to dozens of snakes, but in some locations thousands of Gartersnakes will spend the winter in a single large hibernacula (such as Narcisse Snake Dens, near Gimli, Manitoba).

Melanistic (i.e. all-black colour variation) Common Gartersnake
photo: W. Plath Jr.

Common Gartersnake
photo: Joe Crowley

Northern Watersnake *(Nerodia sipedon)*

COSEWIC Status: Not at Risk, COSSARO Status: Not at Risk

If you spend a lot of time near the shores of rivers, lakes or wetlands, then you've likely seen the Northern Watersnake. However, Toronto no longer boasts the large population it once had. In fact, this species which is common throughout most of the province is incredibly rare within the City of Toronto despite the abundant shorelines. While the cause of decline is unknown, the restoration and revival of Toronto's river valleys brings hope that this snake will once again inhabit our waterways. Northern Watersnakes are grey, brown or dark brown snakes with brown or reddish-brown bands down their back and sides. Juveniles are grey with dark brown banding and the banding gets lighter as they age. Most Watersnakes darken as they get older and often their pattern is difficult to see, although some retain a vivid pattern throughout their lives. The Watersnake is Toronto's largest snake growing between 60-110 cm (24-43 in) in length and having a much thicker body than the other species. Watersnakes rarely move from their shoreline habitat where they can be seen basking on rocks or logs. Females give birth to 10-20 live young averaging 18 cm (7 in) long, but bigger females have longer babies. Watersnakes eat fish and amphibians that they find along the edge of the shoreline in or near the water.

Northern Watersnake
photo: Mandy Karch

Northern Watersnake swimming
photo: George Coker

Juvenile Northern Watersnake
photo: Mandy Karch

DeKay's Brownsnake *(Storeria dekayi)*

COSEWIC Status: Not at Risk, COSSARO Status: Not at Risk

Next to the Common Gartersnake, the DeKay's Brownsnake (often referred to as Brownsnake) is the most commonly seen snake in Toronto. From late spring to mid-autumn Brownsnakes are actively searching for food, mates, and places to give birth to live young and overwinter. During these times people tend to find Brownsnakes moving across roads or trails in less developed parts of the city. It is a small, brown, light brown or grey snake with two rows of small triangular spots along the length of its body. Brownsnakes can grow to over 50 cm (20 in) long but are usually shorter. DeKay's Brownsnakes make use of a wide variety of habitats including forests, wetlands, prairies, meadows and of course, urban areas. They are carnivores and eat many types of invertebrates including slugs, earthworms, and insects, as well as the occasional small fish. Female Brownsnakes give birth to 3-31 live baby snakes that are 8-11 cm (3-4 in) long. Like Gartersnakes, Brownsnakes overwinter in groups. They choose areas that are deep enough to maintain a constant temperature throughout the winter and never freeze. It is not uncommon for Brownsnakes to choose the foundation of a house as an overwintering site. So if you notice several Brownsnakes in your yard in the spring or fall you can proudly boast that you are helping this species during a very important part of its life cycle!

DeKay's Brownsnake
photo: John Mitchell

Dekay's Brownsnake
photo: Mandy Karch

Red-bellied Snake *(Storeria occipitomaculata)*

COSEWIC Status: Not Assessed, COSSARO Status: Not Assessed

The Red-bellied Snake is a widespread snake that is rarely seen. This is because it is nocturnal, meaning it only comes out at night. During the day it hides underground or under rocks and logs in the forest, fields or near forest clearings. By night this snake prefers edge habitats, meadows or fields with lots of cover. Red-bellied Snakes are black, grey or brown with a bright red, or sometimes pink belly. When frightened, a Red-bellied Snake sometimes turns sideways to expose its bright belly in an attempt to ward off potential predators. Red-bellied Snakes are a very small snake reaching a maximum of 40 cm (16 in), but they are usually much smaller than this. They have small home ranges. During the warm season they will stay within 500 m (546 yards) of their hibernaculum. Red-bellied Snakes give birth to 4-14 live snakes, each 7-10 cm (2.75-4 in) long, in late summer. These snakes eat many invertebrates such as grubs, slugs, worms and snails. Count yourself lucky if you happen to see one of these elusive snakes!

Red-bellied Snake
photo: Calvin Knaggs

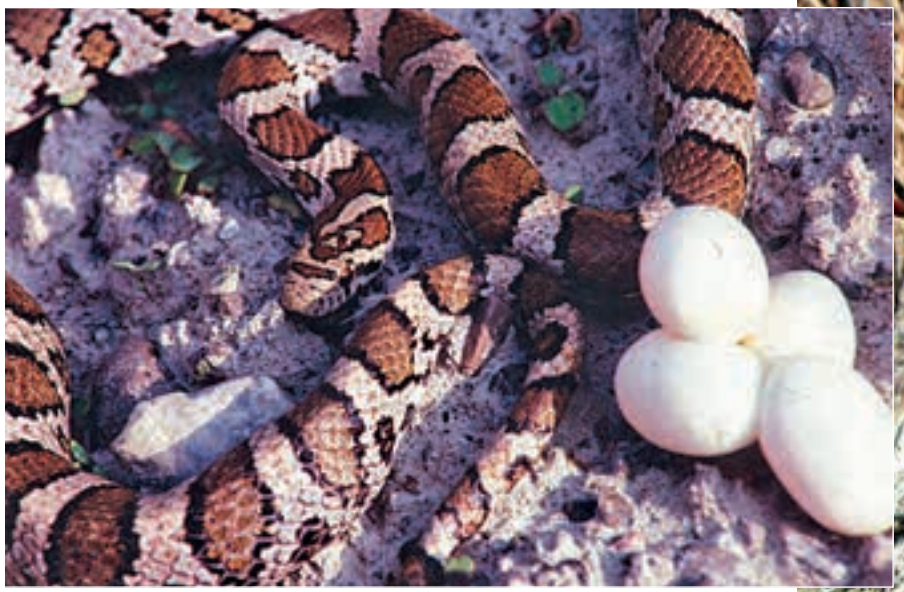
Red-bellied Snake
photo: John Mitchell

Milksnake *(Lampropeltis triangulum)*

COSEWIC Status: Special Concern, COSSARO Status: Special Concern

The Milksnake is the only snake species still occurring in Toronto that is listed as a Species at Risk. Milksnakes eat almost exclusively small rodents such as mice and shrews and therefore they are often found around barns and other areas where mice thrive. This led to the mistaken belief among farming communities that Milksnakes enter barns at night to steal milk from cattle. This is another example of a popular misconception about snakes that has led to unnecessary persecution. Having this beautiful snake around is of great benefit to people as it keeps the rodent population under control.

Milksnakes are notoriously difficult to find as they are nocturnal and spend the daytime sleeping under rocks, inside logs or underground. They are a beautiful animal with bright reddish brown blotches outlined in black or dark brown with a tan or grey background colour. A distinct 'Y' or 'V' shaped spot can often be seen on the top of their heads. The Milksnake can live over 20 years in captivity but their lifespan in the wild is unknown. Females lay between 3 and 24 oval shaped eggs in rotting logs, compost heaps, or small mammal burrows.



Milksnake with eggs
photo: Bob Johnson

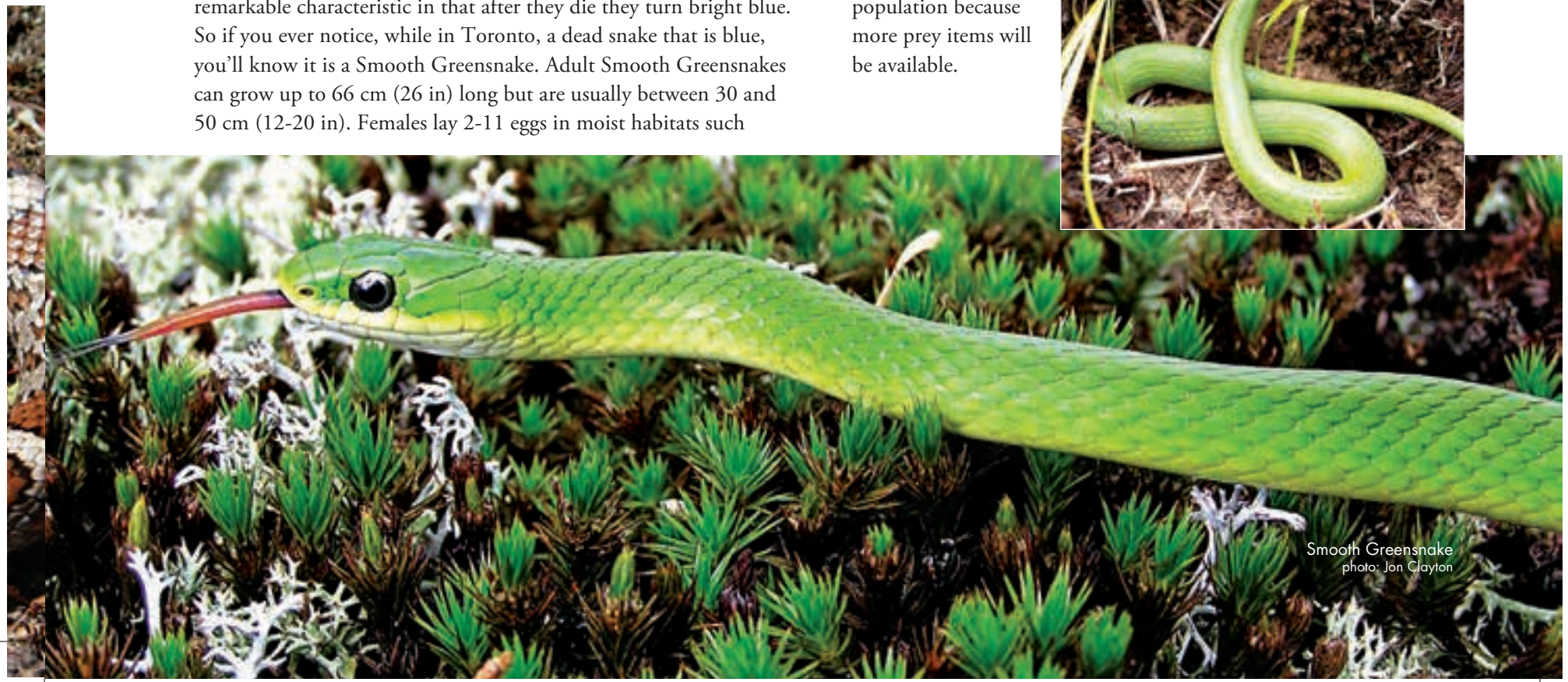
Milksnake
photo: Mandy Karch

Smooth Greensnake *(Opheodrys vernalis)*

COSEWIC Status: Not Assessed, COSSARO Status: Not Assessed

The Smooth Greensnake is a slender, bright emerald green reptile with a cream or yellow-coloured belly. They live in the grassy fields, prairies, meadows, and forest clearings in some of Toronto's larger parks. This snake is a master of camouflage and despite being active during the day they are rarely seen, simply because they blend in perfectly with the grassy vegetation in which they live. Because of their colour and tendency to be found in grass many people have nicknamed this species the "grass snake". While this is not their true name, it does describe them well. Smooth Greensnakes have a remarkable characteristic in that after they die they turn bright blue. So if you ever notice, while in Toronto, a dead snake that is blue, you'll know it is a Smooth Greensnake. Adult Smooth Greensnakes can grow up to 66 cm (26 in) long but are usually between 30 and 50 cm (12-20 in). Females lay 2-11 eggs in moist habitats such as compost piles, rotting logs or underground burrows of small mammals. The young are 10-16 cm (4-6 in) long and are blue-grey to dark green. These snakes are insectivores which means they eat bugs including caterpillars, spiders, crickets and more! With the recent ban on pesticides in Toronto, we are sure to see a positive effect on the city's Greensnake population because more prey items will be available.

Smooth Greensnake
photo: Calvin Knaggs



Smooth Greensnake
photo: Jon Clayton

Amphibians of Toronto: Frogs and Toads

The anuran (frogs and toads) Torontonians are likely to be most familiar with is the American Toad. Not only are they one of the most abundant amphibians in the city, but they are able to move quite far from permanent water. This means that they can be found in many different locations, including backyards! While the American Toad is the only species of toad found in Toronto, there are also seven species of frogs that are regular inhabitants. With a variety of different colours, calls and habits, they are a pleasure to search out.

The word 'amphibian' comes from Ancient Greek and translates into: *"amphi"* = both; *"bios"* = lives. This refers to the lifecycle of these organisms which includes both an aquatic larval stage and a more terrestrial adult stage.

The dual-life of frogs and toads mean that they can be spotted in a variety of environments around the city. Depending on the species, adults make use of aquatic habitats ranging from permanent wetlands to temporary ponds to lay their eggs. It is in these environments that you can find large congregations of males calling for female counterparts in the spring. After the commotion, large masses of eggs; either in clumps, strings, or attached to aquatic plants, are easily spotted. The tadpoles that emerge from these eggs can spend anywhere from a couple of months (e.g., American Toad) to two years or more (e.g., Bullfrog) in this purely aquatic home. Lacking legs and lungs, some think these creatures more closely resemble fish than frogs. It is a process known as metamorphosis that introduces a suite of changes that brings these animals closer to land. Through many complex physical changes, from the growth of lungs and legs to the reabsorption of the tail, the tadpole becomes a frog or toad. It is at this stage where they change their diet – shifting from mostly vegetarian tadpoles to the insect-eating adults that we love to have around. As adults, many frogs can be found hiding amongst aquatic plants in the city's wetlands. However, some species can be difficult to find outside of the breeding season.

Girl with Gray Treefrog
photo: Calvin Knaggs

"Someday we'll find it, that rainbow connection, the lovers, the dreamers and me." – Kermit The Frog

Spring Peeper on pear tree
photo: Calvin Knaggs

A Wood Frog among the leaf litter in its overwintering frozen state
photo: Janet M. Storey

To survive Toronto's long winters, amphibians will typically overwinter in the soft bottom substrate of ponds to avoid freezing temperatures. However, the Wood Frog is remarkable in its ability to tolerate freezing; special sugars in the blood protect cells from the formation of damaging ice crystals. This adaptation enables these frogs to overwinter on land where they bury themselves under leafy debris on the forest floor and emerge first in the spring to breed, well before other species of aquatic frogs have surfaced.

Learning to identify amphibians either by call or by sight will open up an exciting world as you begin to notice frogs and toads on your adventures in our urban landscape.

Vocalizations

On those early April days when we Canadians might be daring enough to go outside in just a t-shirt, the frogs and toads of Toronto know that it is time to wake up and be heard! In the early days of spring there is a lot that must be done to prepare for the upcoming breeding season. Males will move away from their overwintering sites and start congregating around pools, ponds or marshes in areas that would be good for laying eggs.

One way to stand out from the crowd of other males waiting for females is to find the best spot to lay eggs, and scream out "here I am!" in what we refer to as an advertisement call. It is only males that can produce these loud advertisement calls, and they are intended to announce to females where they are located. Another type of call males produce is the territorial call that indicates to neighbouring males that a particular area is his, and "sharing-it-with-another-will-not-be-tolerated!" If a male comes into close contact with another male, they may emit a completely different noise, an encounter call, that tells the intruder that they had better "move on."

Calls from frogs and toads are generally done under the cover of the night. We might hear the occasional call during the day, but the real effort starts when the sun goes down. Roughly two weeks after the males start calling, females come out at night looking for the perfect mate. Females choose males that have established a good territory, and prefer males that call often and are bigger in size. Before a female approaches a male, she can assess his size from his call (deeper calls reflect larger males); healthy males will call often and the duration of the call will be longer.

American Toad calling
photo: Nicole Richards

"And what is there to life if a man cannot hear the lonely cry of a whippoorwill or the arguments of the frogs around a pond at night?"
– Chief Seattle, 1854

If you are ever in an area where frogs are calling, it may sound like absolute chaos; just a lot of random yelling of "here I am." If you wait and listen for a while you will see that males try to avoid calling at the same time as another male. It is to their advantage to call when it is quiet so that the female has every opportunity to assess and locate him. Once one male starts to call, it is not long after that another and then another will start to call. Pretty soon, if there are several frogs in the area they will all be calling – this is called a "chorus."

Not all frogs and toads make noises, as they may have different ways to attract females. However the eight species that can be found in Toronto do vocalize and the calls are unique to each species. As with birds, we can identify frogs by their calls and the time of year they are heard. In the tropics it is possible to hear several species calling at one time. However, in Toronto the breeding season is broken up into early spring, mid-spring, early summer and mid- to late summer. Rarely do we have more than two species calling at one time. The first to appear on the scene are the Spring Peepers and Wood Frogs. They are followed in a couple weeks by American Toads and Leopard Frogs; then in early summer we hear Gray Treefrogs. Last to appear are Green Frogs and Bullfrogs who serenade us during the dog days of summer.

Spring Peeper calling
photo: Chris Law

Toronto's (un)Official Amphibian: American Toad *(Anaxyrus americanus)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

The American Toad is one of Toronto's most common species of amphibians, and is a familiar sight for most gardeners and outdoor enthusiasts. Long considered a backyard friend, toads are great for devouring pests like mosquitoes and grubs, and are good indicators of healthy land and water on our property. In Toronto, the long, musical trill of males attempting to woo a female pierces through the evening air starting in early May. Love abounds as these thick-skinned, bumpy anurans collect with frenzied zest in shallow ponds and marshes to find their perfect partner. Following amplexus (the position where the male "hugs" the female from behind and fertilizes her eggs externally as she lays them), two to four strings of eggs remain that can hatch within three to 13 days. The black tadpoles that emerge from the eggs produce toxic chemicals to ward off predators and cluster in groups in shallow water until they transform into toadlets approximately 40 days later. Once fully developed, the American Toad becomes one of the most terrestrial amphibian species in the city. They can live in almost any habitat including forests, agricultural fields, sandy soils, gardens and compost heaps; however, they still require access to water to complete their life cycle. During the winter, the American Toad digs down to overwinter underground below the frost level, which can be over a metre deep. Toads range in colour from yellow to brown to green, but can be identified to species by the presence of one or two bumps (often inaccurately referred to as warts) per dark spot on their body. Males are typically smaller than females and both sexes have parotoid glands (thick fleshy tissue that secretes a milky alkaloid substance) positioned behind each eye that help to make them unpalatable to predators. Because they absorb water and oxygen through their skin, as all amphibians do, American Toads are sensitive to environmental contaminants and are therefore good indicators of soil and water health.

American Toad
photo: Calvin Knaggs

American Toad
photo: Scott Gillingwater

Bullfrog *(Lithobates catesbeianus)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

The thunderous "jug-o-rum" call of a male Bullfrog often evokes thoughts of summer cottages and camping vacations for many within earshot of Toronto's largest frog. While their call makes them easy to identify, they are frequently mistaken for Green Frogs when observed in nature. Like the Green Frog, individuals vary in appearance – some Bullfrogs have spots while others have none and they range in colour from entirely green on their back to a mix of green and brown to completely brown. A fold of skin that wraps just around the eardrum and ends just above the shoulder is a feature that sets the Bullfrog apart from the Green Frog. Additionally, their size can give them away – Bullfrogs average 10-15 cm (4-6 in) in length.

Bullfrog tadpole
photo: Jamie Richards

Partial to deep, permanent bodies of water, Bullfrogs can be found along the shores of lakes, bays and even large beaver ponds. Because the tadpoles overwinter in the water, these deeper habitats are essential so that they can take refuge well below the level of the ice. Male Bullfrogs are territorial by nature and will defend their breeding grounds from other males first by emitting a warning call, and then followed by brute force if necessary. If startled, Bullfrogs will jump and emit a call just before they enter the water. This is a warning call to other Bullfrogs letting them know of the approaching danger.

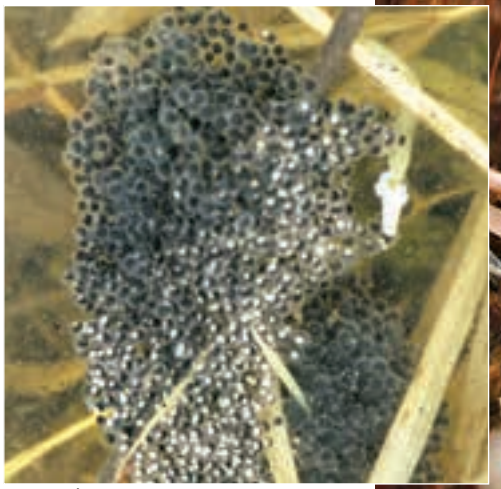
Over the past 15 years, scientists have seen a decline in Bullfrog populations. Historically harvested for the meat on their hind legs, certain populations have suffered from the pressures of hunting. Today, hunting Bullfrogs is not as common, but we still continue to see their numbers decline. The cause of this decline remains a topic of some debate.

Bullfrog
photo: Joe Crowley

Leopard Frog *(Lithobates pipiens)*

COSEWIC Status: Not at Risk, COSSARO Status: Not at Risk

As the name suggests, the Leopard Frog is typically covered with dark, round or oval-shaped spots that are outlined in a lighter colour making the spots more obvious. This distinguishes the species from the Pickerel Frog that has paired square or rectangular spots. Leopard Frogs average 5-9 cm (2-3.5 in) in length and are generally green, but may also be light brown in colour. Widely distributed in Ontario, Leopard Frogs can be found near almost any water source in the spring, most often around lakes, ponds, marshes and wet meadows. These are also ideal breeding sites for the species – a process that takes about three weeks in total from male calling, to female arrival and the depositing of eggs. The males typically call from the surface of the water and the sound is often likened to wet hands rubbing a balloon or a long snore followed by chuckling. Submerged vegetation is an excellent place to ensure the safety of the eggs; alternatively, Leopard Frog eggs come to rest at the bottom of the breeding pond. Once hatched, the tadpoles transform into froglets in August or even later. The froglets overwinter in the mud at the bottom of permanent water bodies to avoid freezing in the winter.



Leopard Frog eggs
photo: Bob Johnson

Leopard Frog
photo: Joe Crowley

Pickerel Frog *(Lithobates palustris)*

COSEWIC Status: Not at Risk, COSSARO Status: Not at Risk

Found throughout southern Ontario, the Pickerel Frog is a medium-sized species, averaging 4-7 cm (1.5-3 in) in length. Unlike many Toronto frog species which vary in colour from shades of brown to green depending on age and time of year, the Pickerel Frog has a brown or greyish-brown base colour throughout its life. While the Pickerel Frog is often mistaken for the Leopard Frog, the paired square or rectangular spots down its back, a yellow wash on the groin, and well defined, brassy dorsolateral lines (the raised ridge running on either side of the back) set it apart. Furthermore, its short, low-pitched call reminiscent of snoring in the distance, is also unique and fairly easy to distinguish. Cool streams in forests or meadows are preferred habitat for adult Pickerel Frogs and they can occasionally be observed around flooded ditches. Males call in May, usually from underwater, which prevents the sound from carrying as far as the calls of other frog species. The eggs are attached to submerged vegetation, likely to prevent them from being carried away and damaged by running water. Pickerel Frogs are not currently listed as a Species at Risk by federal or provincial authorities, however, habitat loss or alteration due to human activity remains a concern for the future of the species. Currently this species has been recorded at only one location in the east end of the city.

Pickerel Frog
photo: Mandy Karch

Pickerel Frog
photo: Calvin Knaggs

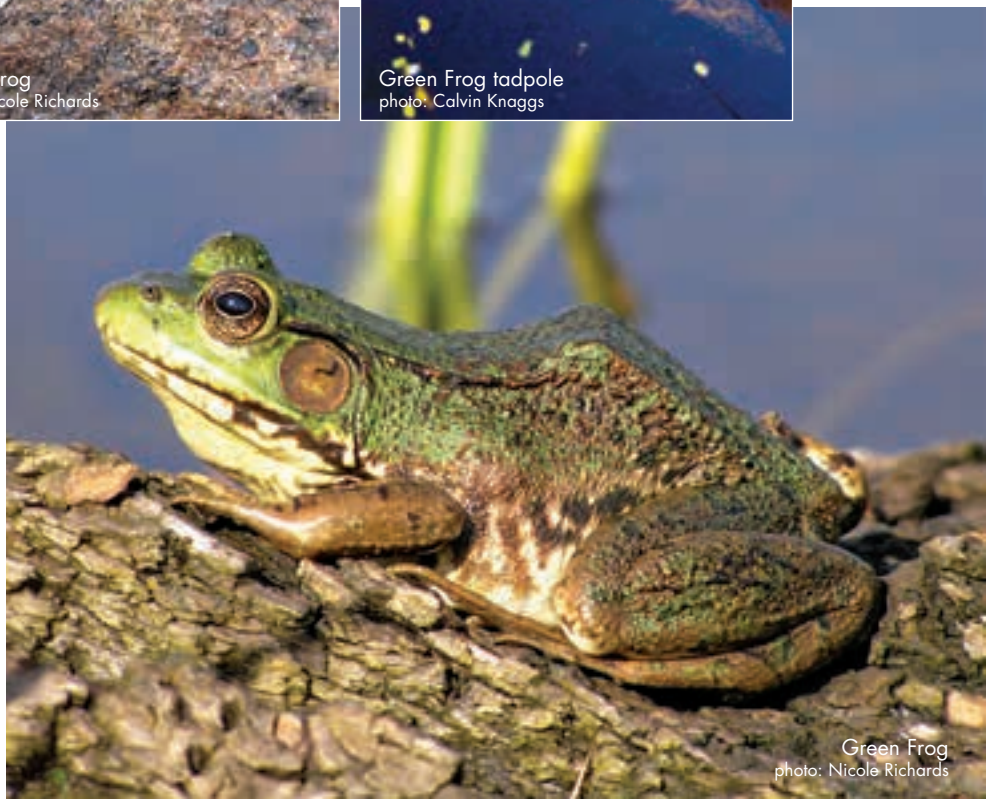
Green Frog *(Lithobates clamitans)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

The sight of a Green Frog leaping towards a water lily is a fantastic reminder that it's summer in Toronto! Often mistaken for the larger Bullfrog, Green Frogs are distinguished by two ridges of skin that begin behind the eye and extend part way down their backs (in Bullfrogs these same skin ridges curve only around the eardrum). Green Frogs vary in colour from yellow to green to bronze, and are often speckled with brown spots near the rear end and a banding pattern on their hind legs. Occasionally metallic-looking blue morphs can be found when frogs are lacking yellow skin pigments. As in most frogs, the intensity of skin colour can vary with conditions in the surrounding environment such as moisture and temperature. Perhaps the best identification cue is the familiar sound of the Green Frog's call, similar to the plucking of a loose banjo string, which can be heard throughout a summer's day but mainly during the first hours of light in the morning.

Green Frog
photo: Nicole Richards

Green Frog tadpole
photo: Calvin Knaggs



Green Frog
photo: Nicole Richards

Green Frogs are common in lakes, ponds and streams throughout the city, and will inhabit almost any body of freshwater where there is an abundance of food and plant life. They eat a variety of small animals including beetles, spiders, snails, and minnows. This species breeds in June and July and males defend territories so that females can spawn in the best vegetated areas of the wetland. Females lay 1500 to 5000 eggs in a mass attached to vegetation; tadpoles hatch in late summer and overwinter in their birth place, transforming the following summer, about one year after hatching. Adults overwinter underwater beneath silt and dead plant matter. Green Frogs are found in most green spaces near wetlands throughout Toronto, and have experienced some success in repopulating areas that, due to heavy fertilizer or pesticide use, were previously inhospitable.

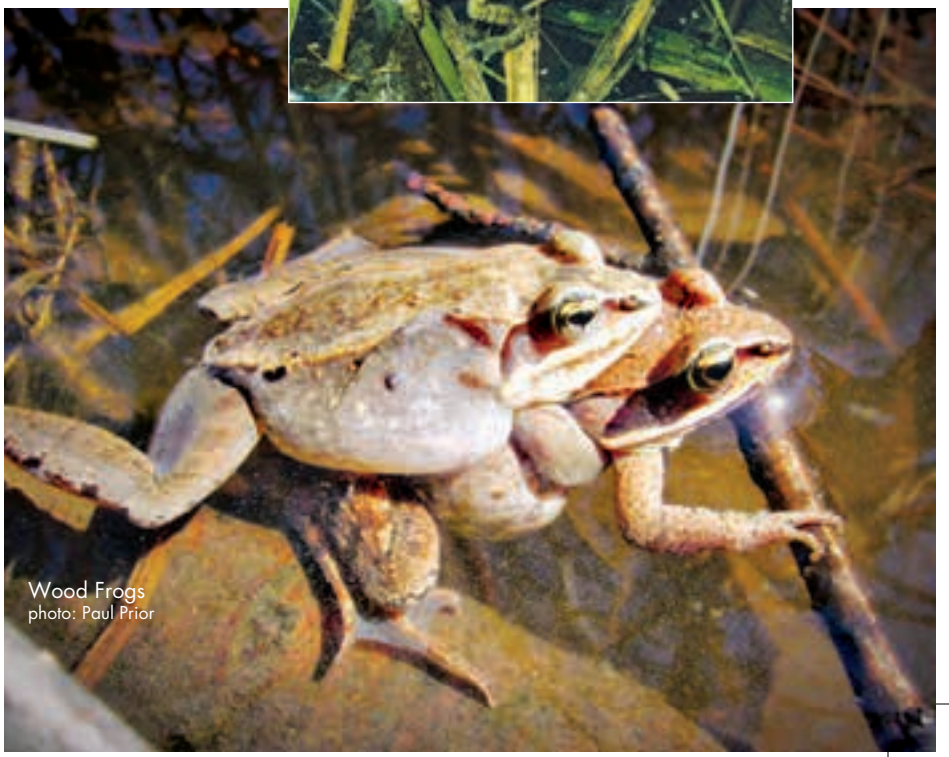
Wood Frog *(Lithobates sylvaticus)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

The Wood Frog is another species that has almost completely disappeared from Toronto; there are only a few small breeding groups remaining. The Wood Frog is a largely terrestrial frog that grows to about 5 cm (2 in) in length. Their colour varies from brown to red to tan or anything in between. This frog is truly amazing because it can survive the freezing of 60-70% of its body fluids and sustained temperatures of -6°C. During this time the Wood Frog stops breathing and its heart stops beating. As a result, the Wood Frog is the only amphibian species that can be found north of the Arctic Circle! Wood Frogs overwinter on land in forest leaf litter or under rocks. Overwintering close to the soil's surface, they are able to thaw and awake very early in the spring and reach breeding pools before any other species of frogs have arrived. Each spring, female Wood Frogs can lay over 2000 eggs in a single mass in a temporary pool. If the pond is drying up, the tadpoles can sense the chemical changes in the water and speed up their development to avoid being stranded on land as a tadpole. When Wood Frogs emerge from these temporary pools, they spend the rest of the summer foraging for food in the forest. Like most other amphibians, they eat a variety of invertebrates.

Wood Frog in metamorphasis
photo: Bob Johnson

Wood Frog
photo: Calvin Knaggs



Wood Frogs
photo: Paul Prior

Spring Peeper *(Pseudacris crucifer)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

Distributed throughout Ontario, with the exception of more northern regions, the sound of Spring Peepers is a sure sign of spring's arrival. Beginning in early April and May, the familiar "peeping" calls of male Spring Peepers in chorus can be heard through to July, and individuals can occasionally be heard in early fall. At an average length of 2-3.5 cm (0.8-1.4 in), Spring Peepers are much easier to hear than to see.

They range from tan to brown in colour and have dark bands around their hind legs and an X-shaped mark on their back (hence the word "crucifer" in their scientific name). Two other distinguishing features of the species include a stripe extending from the tip of the snout to the eardrum (tympanum) and a bar that extends between the eyes. These markings, however, may be more or less distinct, depending on the colour of the individual frog.

Adult Spring Peepers overwinter at a fairly shallow level in the soil, under a rock, or in the leaf litter, leaving them exposed to harsh sub-zero temperatures. Like Wood Frogs, they have mastered the ability to freeze almost completely, giving them that early spring advantage so they are among the first species to be heard when spring showers start to fall in late March.

During breeding season in early spring, Peepers frequent vernal, or temporary, water bodies – typically in wooded areas – formed by seasonal rain or snow melt. The remainder of the time, they search for food near woodlands, around shrubs and marshes.

Eggs are laid in small masses and hatch into tadpoles in approximately two weeks. Near the end of July, the tadpoles transform and move onto land, beginning a terristrial life stage.

Spring Peeper
photo: Calvin Knaggs

Spring Peeper
photo: John Urquhart

Spring Peeper
photo: John Urquhart

Gray Treefrog *(Hyla versicolor)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

Commonly found near woodlands, the Gray Treefrog is Toronto's only arboreal (living off the ground, in trees) amphibian. Their arboreal lifestyle is made possible by their enlarged toepads, enabling them to cling to vegetation. The Gray Treefrog is easily identified by the army fatigue pattern of green, grey and black on their back, and by their bright yellow-orange inner thighs. Their call is a short, high-pitched trill that may be heard echoing from the forest surrounding woodland ponds. These frogs have the unique characteristic of having skin which changes colour depending on the temperature of the surrounding environment; at cool temperatures their skin is a charcoal or grey colour and at warmer temperatures they transform to silver-grey or brilliant green. Newly metamorphosed froglets are an emerald green with the adult colour appearing after one month.

In the summer months, treefrogs can be found in wetland areas ringed with shrubs, and in woodland areas. They mate in early spring in marshes, ponds and still backwater streams, and lay eggs singly or in bunches, attaching them to submerged vegetation. Tadpoles have a broad tail that turns a brilliant orange-red when in predator-rich environments and metamorphosis occurs by late August or September. Like most frog species in the city, and indeed, the world, the Gray Treefrog is heard less commonly in the city today than it was even 30 years ago.

Gray Treefrog
photo: W.A. Crich

Gray Treefrog
photo: Calvin Knaggs

Gray Treefroglet
photo: Calvin Knaggs

Amphibians of Toronto: Salamanders

Most tailed amphibians are found in areas near to mature woodlands with rich moist soils. The Eastern Red-backed Salamander is the most widely distributed and abundant tailed amphibian in Toronto, surviving in the heart of the city perhaps due in part to the fact that, unlike most amphibians, it does not require standing water in which to breed. Instead, fully formed tiny salamanders emerge from their eggs without undergoing the free-swimming larval stage that characterizes all of our other amphibian species. A second species, the Eastern Newt, is known from a handful of locations around the city where its survival may be facilitated by a terrestrial stage of development – the red eft – which can survive on undisturbed forest floors hundreds of metres from the nearest pond.

The Mudpuppy and Spotted Salamander are known from only one or two locations in the city. The latter species relies on rich woodlands with vernal pools for spring breeding. They prefer cool, moist woodland soils and disappear underground for the summer as temperatures rise – hence their descriptive name as "mole" salamanders. That they were recorded most recently in the Rouge and Humber River valleys is indicative of the remaining pockets of high-quality habitats that support biodiversity in these river valleys. The Mudpuppy is Canada's largest salamander, often found in rivers or in coastal wetlands around lakes. It was once reported as being abundant around the shoreline of the Toronto Islands. Its large size, unusual appearance with large, red external gills, and inclination to bite at baited hooks often leads to its demise and stories of the "deformed" monster caught while fishing. Take the time to familiarize yourself with these elusive creatures.

Eastern Newt, adult
photo: W.A. Crich

Spotted Salamander
photo: Calvin Knaggs

Spotted Salamander *(Ambystoma maculatum)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

The Spotted Salamander is one of Toronto's largest terrestrial salamanders. Unfortunately, very few remain within the city limits due to the drying out and loss of our mixed deciduous forests, its natural habitat. The Spotted Salamander is black with bright yellow spots and grows to over 20 cm (8 in) in length. They are a nocturnal species that spend much of the year underground, or in rotting logs. They are typically only seen during the breeding season in wood lot ponds that completely dry up by late summer. They may be seen on warm, rainy summer nights when they are taking advantage of the moisture to forage or to move from one habitat to the next without the risk of dehydration.

Salamander eggs
photo: Calvin Knaggs

Spotted Salamander
photo: Chris Law

Female Spotted Salamanders lay up to 250 eggs in one mass that is attached to underwater vegetation. The larvae hatch in about 30 to 45 days depending on water temperature and most transform into miniature versions of the adults in September and October. They take 2-5 years to become sexually mature and can live to be over 30 years old! Both adult and larval Spotted Salamanders are carnivorous with larvae feeding on a variety of aquatic invertebrates and adults feeding on a variety of terrestrial invertebrates.

Spotted Salamander
photo: Paul Prior

Mudpuppy *(Necturus maculosis)*

COSEWIC Status: Not at Risk, COSSARO Status: Not at Risk

Toronto is home to Canada's largest amphibian, the Mudpuppy, which can grow to an astounding 50 cm (20 in) in length. This species never seems to grow up – at least it doesn't look like it. These salamanders retain their juvenile characteristics as they get older (a state known as neotony). They remain in water their entire life and keep their red, feathery larval external gills as an adult. It takes four to six years for Mudpuppies to reach maturity, but some can live over 30 years. It is hard to tell if a Mudpuppy is an adult, but generally when they are 20-25 cm (8-10 in) in length, they are sexually mature, although they continue to grow.

Unlike most amphibians, Mudpuppies are active all year round. In winter, they are usually found at the bottom of deep lakes below the ice. In fact, Mudpuppies are most often seen when they are accidentally caught by ice fisherman. In spring, females lay 30-190 eggs on the underside of submerged rocks or logs. The female will guard the eggs for two months until they hatch, not eating for the entire time she is protecting them.

Although Torontonians are lucky to have such amazing creatures living in their midst, Mudpuppies are rarely seen. Generally, they are found in deep water, well out of view. When they do venture into shallower water their grey to rusty brown body colour keeps them well camouflaged in the muddy streams they inhabit.

Mudpuppy
photo: W.A. Crich

Mudpuppy
Illustration: Wallace Edwards
Image courtesy of Toronto Zoo Adopt-A-Pond Programme

Eastern Red-backed Salamander *(Plethodon cinereus)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

Few people have seen this hidden treasure. However, the Eastern Red-backed Salamander is often the most abundant vertebrate in our woodland landscapes.

This small (10 cm [3.4 in] in length) and slender salamander has two different colour phases. The more typical is dark grey with a broad, red, brown or orange stripe down the back from head to tail, referred to as the "red-back" phase. The red colour might afford them some extra protection as they are thought to be a mimic of the toxic red eft stage of the Eastern Newt. The "lead-back" phase is solid black or dark grey with no stripe at all. In both phases, this salamander has blue and white mottling on the belly and lower sides.

Eastern Red-backed Salamanders are the only amphibian in Ontario that do not require standing water (streams, pools or lakes) at any stage of their life cycle. They lay their eggs in or under rotting logs or other moist areas of the forest floor. The females tend the eggs for six to eight weeks and stay with the hatchlings for one to three weeks.

These salamanders live in the deciduous or mixed forests of Toronto's parks but are rarely seen as they spend most of their time under logs, leaves and rocks. It is essential that they keep their skin moist since this is how they breathe; they do not have lungs and must absorb oxygen through their skin. In fact, during the really dry times this salamander will hide underground. It usually winters underground and may retreat into the subterranean dens of small mammals or even into ant nests. This species, which defends its small territory from other salamanders and tends to wander very little, eats a variety of small terrestrial invertebrates and is sometimes cannibalistic, eating other Red-backed Salamanders.

Eastern Red-backed Salamander. Examples of the red-back phase (above) and the lead-back phase (below)
photo: Calvin Knaggs

Eastern Red-backed Salamander
photo: Mandy Karch

Eastern Newt *(Notophthalmus viridescens)*

COSEWIC Status: Not at Risk, COSSARO Status: Not Assessed

The Eastern Newt is a salamander that is a spectacle rarely seen in Toronto due to its mostly aquatic lifestyle and its reclusive habits. Newts lay eggs in the water where they hatch into aquatic larvae that have gills on the outside of their body. The Eastern Newt has a very unusual life cycle. When the larvae are ready to transform, they absorb their gills, turn bright orange or red, and move onto land where they live for 2-3 years in the forest and near wetlands. During this juvenile or teenage life stage Eastern Newts are called "red efts". Each autumn mature efts will migrate by the thousands to the wetlands where they will transform into adults and spend the rest of their lives in the water.

Red efts are brightly coloured to advertise to predators that they are poisonous. They secrete a poison through their skin which is harmful to predators if ingested. This poison is not harmful to humans but if you should need to help one across a road, you might want to wash your hands thoroughly to be extra cautious.

The adult Eastern Newt is a small brown newt (up to 14 cm [5.5 in] in total length) with a row of very small red or orange spots outlined in black on each side of its back.

In the spring, adult males will congregate in woodland pools and attempt to locate females. Eastern Newts have a courtship behavior unlike any of Ontario's other salamanders species. First, the male will swim in front of the female and clasp her head with his hind legs while rubbing his chin on her snout and waving his tail in front of her face. The tail waving is meant to direct special chemicals (called pheromones) from scent glands to the female. If the female accepts the male, he leads her away and eventually deposits a sperm packet on the bottom of the pool. The female moves over it until her genital opening (cloaca) is directly above the packet where she picksit up and absorbs the sperm. Female Eastern Newts can lay between 200 and 400 eggs each spring. Each egg is laid separately on underwater vegetation. The lifespan of Eastern Newts can exceed 10 years. They eat a variety of insects, small crustaceans, amphibian eggs and even amphibian larvae. Their habitat consists of permanent and temporary wetlands, forests, and meadows with lots of woody or rocky debris.

Eastern Newt, red eft stage
photo: Paul Prior

Courtship behaviour in the Eastern Newt
photo: John White

Salamander breeding pool
photo: Scott Gillingwater

Eastern Newt, adult
photo: John Mitchell

Enjoying Reptiles and Amphibians in Toronto

Some amphibians and reptiles, such as the American Toad, are found throughout the city. However, for the less common species, there are some specific locations that provide particularly good viewing opportunities. These areas include the Rouge Valley and its lakeside marshes, the Humber Valley and surrounding coastal marshes, the Toronto Islands, Leslie Street Spit, and the West Humber and High Park wetlands.

American Toad
photo: Paul Prior

Painted Turtles
photo: Ann Gray

The types of habitat that support the highest reptile and amphibian diversity include flooded and moist forests, wet meadows, temporary spring pools and marshes. Unfortunately, all of these are impacted by urban drainage projects and the lowering of water tables. The consequence is that these preferred habitats dry up too early in the season, making them unsuitable for breeding and overwintering.

Fortunately, it may not be too late. There has been a recent surge in habitat restoration projects and stewardship initiatives. There is also a renewed appreciation in Toronto for the role wetlands and forests play in sustaining biodiversity and maintaining a healthy urban ecosystem.

Toronto wetlands
photo: City of Toronto

Observing Reptiles and Amphibians Responsibly

Amphibians and reptiles are best left alone. Luckily, the best way to look for many of them is from a distance. If you are searching for turtles, binoculars provide the best way to view these skittish animals. Scanning fallen logs in ponds and rivers for basking turtles is a great way to seek them out without having to handle them or disturb their habitat.

Most anurans (frogs and toads) are heard rather than seen, and learning their different calls is a rewarding and effective way to identify the diversity of Toronto's amphibians. This means that going out on warm, wet spring nights can be a very productive way to locate frogs.

There are times when you may need to handle reptiles and amphibians, perhaps to move them off a road or otherwise protect them. Sometimes you may also find yourself accidentally disturbing amphibian and reptile habitat in some way. Understanding the needs of reptiles and amphibians is important to ensuring you don't cause them harm. Avoid handling amphibians and reptiles if you have lotion, sunscreen, antibacterial cleanser or insect repellent on your skin. Remember that amphibians are especially sensitive; they really do absorb harmful chemicals through their skin.

When handling salamanders remember that some species do not have lungs. They take in oxygen through moist skin. Just because you might find the animal on land doesn't mean it breathes the way you do! These lungless salamanders must stay moist, so leaving them in their damp habitat and keeping handling to an absolute minimum are the best ways to protect them.

Many frogs, snakes and salamanders spend a lot of time hiding to escape from predators and regulate body temperatures. When a rock or log is flipped over, or removed, some of their habitat is lost. So if you have moved anything, be sure to replace it exactly how you found it. If there was an animal underneath, safely move it to one side if there is a risk you might crush it. If you place the animal beside its hiding place, it will find its way back underneath. If you must handle snakes and turtles, remember to never hold them by their tail. This can cause damage to their spine, and it leaves you more susceptible to getting bitten. Keep in mind, that it is always best to leave nature as you found it. Part of the joy of seeing these amazing creatures in their natural habitat is to witness how they move and interact with other organisms in our urban landscape.

Gartersnake mating ball
photo: Ann Gray

A Chronology of the Toronto Reptile and Amphibian Year

JANUARY/FEBRUARY

In the coldest winter months ice, frozen ground, leaf litter and rocky outcroppings provide an insulated barrier under which amphibians and reptiles continue overwintering. This is the time of year when amphibians and reptiles experience the highest levels of mortality. Some of those seeking shelter from the subzero temperatures find themselves frozen in shallow waterways or in burrows that aren't deep enough to protect them from the frost as it creeps even deeper into the ground. Those underground who have survived the frost now face the second most common cause of mortality – dehydration.

MARCH

As the day length increases amphibians and reptiles become more active. For some, increased activity is brought on by the light that is visible under snow and ice. For others, an internal rhythm or slight increase in ground temperature signals that it's time to move towards the surface.

In years with early spring-like weather we might see a few restless snakes (Common Gartersnakes, DeKay's Brownsnakes, and Milksnakes) emerge from underground to bask at the entrance of their shelter during unseasonably warm days, but then retreat during chilly nights or prolonged cold spells. As pond margins thaw mole salamanders (Blue-spotted and Spotted Salamanders) march to the open water, often navigating over ice and drifts of melting snow. Wood Frogs and Spring Peepers, species that spend the winter under leaf litter, emerge very early in spring (once air temperatures reach 10°C) to take advantage of the many

photo: John White

predator-free pools formed by melting snow for breeding. However, these pools are also the first to dry up, so it is a race to emerge early, breed and have larvae transform before the temporary ponds evaporate.

Male wood frogs arrive at the pools first to call and attract females, and females arrive approximately one week later. Breeding takes place over a three day period. This coincides with the breeding season of the Spring Peeper, although male Peepers tend to vocalize a little longer than male Wood Frogs.

Occasional reports of Green Frogs sitting on ice or snow may be the result of a hasty retreat from ponds that have become anoxic (entirely depleted of oxygen) over the winter.

APRIL/MAY

The last of the snow and ice are melting and the deep frost is receding from the ground, a process that is accelerated by the warm spring rains. This is the time of predictable species emergence, courtship and breeding, and, not surprisingly, the best opportunity for viewing amphibians and reptiles (or listening in the case of calling frogs!). In general, all of Toronto's reptiles and amphibians are on the move when daytime temperatures reach 15°C or above. This usually occurs by the beginning of April, but in warm years can occur as early as the end of March. The chronological order of visible species activity or calling (based on 25 years of sampling by Toronto Zoo) occurs as follows:

Amphibians

Wood Frog
Spotted Salamander
Spring Peeper
Eastern Newt
Leopard Frog
Eastern Red-backed Salamander
American Toad
Green Frog
Gray Treefrog
Bullfrog

Reptiles

Common Gartersnake
DeKay's Brownsnake
Milksnake
Red-bellied Snake
Blanding's Turtle
Painted Turtle
Northern Watersnake
Snapping Turtle
Smooth Greensnake
Stinkpot (Musk) Turtle

The first Snapping and Painted Turtles to nest will lay eggs in late May. Toronto's turtles are most easily seen this month because they bask above water more frequently than at other times of the year, and are generally more reluctant to dive back into cold water when their bodies are cold and lethargic in early spring. Basking helps to increase metabolic rates for feeding and egg development. Painted Turtle hatchlings that have overwintered in the nest will emerge and move to nearby bodies of water. Most of Toronto's amphibians will lay eggs this month.

JUNE

This is turtle month! The first two weeks of June are a nesting frenzy for turtles. Turtles on the move at this time of year are usually females searching out ideal egg laying sites (sandy, well drained soils and gravels with a southern exposure to the heat of the sun). This is also the month of peak calling and egg laying for Green Frogs and the time when tadpoles of this species that have overwintered begin to transform from tadpole to froglet. The first Wood and Leopard Frog tadpoles may be seen transforming into froglets along shorelines, and tiny American toadlets begin to emerge from the warmest ponds.

JULY

Reptiles and amphibians are actively feeding and behaviourally thermoregulating – adjusting exposure to the sun to maintain a body temperature surprisingly close to that of mammals. Turtles can remain in the water to bask in the sun, floating just under the surface. Many snakes raise their body temperatures while concealed under grasses, rock ledges or even sheets of metal or wood; or garbage from our urban environments. Salamanders

become less active at this time of year, and may even lay dormant deeper in the soils as temperatures warm and surface soils become drier. Most amphibian larvae (tadpoles) finally complete metamorphosis; their front legs emerge and their gills disappear, forcing them to move onto land to breathe oxygen from the air. If rains are frequent, emergence of metamorphosed amphibians occurs on a continuous basis, and is not easily observed. However, if rains are infrequent it is much more common to observe the tiny metamorphs piling up along shorelines or sheltering under vegetation and logs near ponds, preparing to move in mass migrations the first night the rains finally hit. This is when our roads are covered with frenzied amphibians and many are killed along short stretches of roads near wetlands.

AUGUST

During the heat of this month most amphibian activity is stimulated by rain, and again, many are seen crossing roads as they move to and from nearby wetlands. Gartersnakes give birth in late July and early August, timed so the young snakes have an abundance of small frogs to feed upon. During this month the first Milksnake and Greensnake eggs hatch along with the eggs of turtles that have selected the warmest egg laying locations. Turtle eggs in cooler locations will hatch in another two weeks.

SEPTEMBER

Most turtle eggs hatch in early September and this is the time of year that you are more likely to find tiny turtles emerging from their nests. However, many Painted Turtle hatchlings remain in the nest chamber through the winter and emerge the following spring. Painted Turtles are adapted to tolerate frost in the nest whereas other turtle species are not; eggs that have not hatched will die once the temperatures dip below freezing. If frost arrives early, the first movements toward overwintering sites begin, especially among Toronto's reptiles. Some individuals return to the same site to overwinter year after year. It is uncanny how they can use the same pathways on the same date to arrive at their overwintering location!

OCTOBER

October is a very active month. As the days shorten and night temperatures cool, amphibians and reptiles make their journey to overwintering shelters. Usually the first two weeks of this month offer the last opportunity to feed before metabolic rates slow with the cooling weather. American Toads may be observed slowly walking across roads as cold caricatures of themselves, easily mistaken for blowing leaves. Some, like Blanding's and Snapping Turtles, move individually up streams or over land to deep river pools, undercut river banks or mucky, spring-fed ponds. Others, like Map Turtles, congregate at the bottom of lakes and deep rivers. Snakes can travel over almost identical routes to the ones they followed in spring to find their overwintering locations. Due to the large number of individuals that move during this short period of time it can appear as though animals are travelling *en masse*. Amphibians may also appear to be moving in large migrations as they wait for a rainy evening when it is safe to move.

NOVEMBER

This is the last month of activity and by the end of November all amphibians and reptiles are overwintering. So where do amphibians and reptiles overwinter? All turtles overwinter underwater or in saturated mud; only the Blanding's Turtle tolerates water that becomes highly oxygen deficient over the winter. All snakes must find their way underground below the frost line through mammal burrows, decayed tree roots and stumps, natural crevices or, in urbanizing environments, through the walls of concrete porches, foundations of buildings or old wells. There are a variety of strategies among the frogs and toads. The American Toad will bury itself on land below the frost line; it is critical that this species finds sandy soil that is easy to dig in to. Green and Leopard Frogs avoid frost by overwintering on the bottom of ponds, and some Green Frogs may even overwinter in moist, mucky soils on land. Amazingly, Wood Frogs,

Spring Peepers and Gray Treefrogs actually tolerate ice in their extra-cellular fluids; they hibernate on land just below the leaf litter but above the frost line! There is still some activity during this month, however. The days may not be warm enough for feeding but some animals will emerge to bask at the edge of their selected hibernaculum. They may also move around underground as they select areas with preferred temperatures or moisture levels that provide high humidity and prevent dehydration.

In addition, some ponds and rivers remain ice-free; here amphibians and reptiles move to find aquatic shelters away from strong currents, or near deep pools.

DECEMBER

By December, the ice has usually formed on ponds and the ground is frozen, trapping many species underground in their selected refuge. Those animals that have not entered a shelter safe from the freezing temperatures will face unfavourable circumstances, and often, death. Amphibians and reptiles may still move within their overwintering shelter – there are reports of Mudpuppies, turtles and frogs seen moving below clear ice. Surprisingly for the Mudpuppy, Ontario's largest amphibian, the winter months are the peak period for feeding; unfortunately this means Mudpuppies may be caught on the baited hook of an unsuspecting ice fisherman!

Checklist of the Reptiles and Amphibians of Toronto

Below is a checklist of the species that have been found within the Toronto city limits. Some species have long ago disappeared and this local disappearance is called extirpation. The Species At Risk Act (SARA) governs the process for assessing the conservation status of wildlife species that may be at risk of extinction in Canada (COSEWIC: Committee on the Status of Endangered Wildlife in Canada) or within Ontario (COSSARO: Committee on the Status of Species at Risk in Ontario). In many cases the threat level to a species at the national level is mirrored at the provincial level. The column on the far right indicates if a species is currently found within the city limits.

Common Name	Scientific Name	COSEWIC	COSSARO	Toronto City Limits
REPTILES				
☐ Snapping Turtle	*Chelydra serpentina*	Special Concern	Special Concern	Present
☐ Painted Turtle	*Chrysemys picta*	Not at Risk	Not at Risk	Present
☐ Northern Map Turtle	*Graptemys geographica*	Special Concern	Special Concern	Present
☐ Stinkpot (Eastern Musk) Turtle	*Sternotherus odoratus*	Threatened	Threatened	Present
☐ Blanding's Turtle	*Emydoidea blandingii*	Threatened	Threatened	Present
☐ Spiny Softshell Turtle	*Apalone spinifera*	Threatened	Threatened	Extirpated
☐ Red-eared Slider	*Trachemys scripta*			Introduced
☐ Wood Turtle	*Clemmys insculpta*	Endangered	Endangered	Extirpated
☐ Spotted Turtle	*Clemmys guttata*	Endangered	Endangered	Extirpated
☐ Common Gartersnake	*Thamnophis sirtalis*	Not at Risk	Not Assessed	Present
☐ Northern Watersnake	*Nerodia sipedon*	Not at Risk	Not at Risk	Present
☐ Red-bellied Snake	*Storeria occipitomaculata*	Not Assessed	Not Assessed	Present
☐ Dekay's Brownsnake	*Storeria dekayi*	Not at Risk	Not at Risk	Present
☐ Smooth Greensnake	*Opheodrys vernalis*	Not Assessed	Not Assessed	Present
☐ Milksnake	*Lampropeltis triangulum*	Special Concern	Special Concern	Present
☐ Queensnake	*Regina septemvittata*	Endangered	Endangered	Extirpated
☐ Ring-necked Snake	*Diadophis punctatus*	Not Assessed	Not Assessed	Present
☐ Eastern Ribbonsnake	*Thamnophis sauritus*	Special Concern	Special Concern	Extirpated
☐ Eastern Hognose Snake	*Heterodon platirhinos*	Threatened	Threatened	Extirpated
AMPHIBIANS				
☐ American Toad	*Anaxyrus americanus*	Not at Risk	Not Assessed	Present
☐ Bullfrog	*Lithobates catesbeianus*	Not at Risk	Not Assessed	Present
☐ Leopard Frog	*Lithobates pipiens*	Not at Risk	Not at Risk	Present
☐ Pickerel Frog	*Lithobates palustris*	Not at Risk	Not at Risk	Present
☐ Green Frog	*Lithobates clamitans*	Not at Risk	Not Assessed	Present
☐ Wood Frog	*Lithobates sylvaticus*	Not at Risk	Not Assessed	Present
☐ Spring Peeper	*Pseudacris crucifer*	Not at Risk	Not Assessed	Present
☐ Gray Treefrog	*Hyla versicolor*	Not at Risk	Not Assessed	Present
☐ Western Chorus Frog	*Pseudacris triseriata*	Not at Risk	Not at Risk	Extirpated
☐ Spotted Salamander	*Ambystoma maculatum*	Not at Risk	Not Assessed	Present
☐ Mudpuppy	*Necturus maculosus*	Not at Risk	Not at Risk	Present
☐ Eastern Newt	*Notophthalmus viridescens*	Not at Risk	Not Assessed	Present
☐ Eastern Red-backed Salamander	*Plethodon cinereus*	Not at Risk	Not Assessed	Present
☐ Blue-spotted Salamander	*Ambystoma laterale*	Not at Risk	Not Assessed	Extirpated

Conservation Status recognized by SARA (Species At Risk Act)

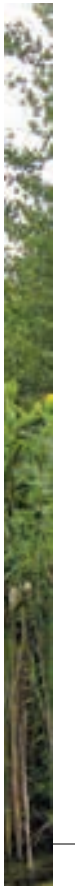
Extirpated - A species that no longer exists in the wild in Canada (COSEWIC) or in Ontario (COSSARO) but still occurs elsewhere.

Endangered - A species facing imminent extinction or extirpation in Canada (COSEWIC) or only in Ontario (COSSARO) and thus becomes a candidate for regulation under Endangered Species Act.

Threatened - A species that is at risk of becoming endangered in Canada or in Ontario if limiting factors are not reversed.

Special Concern (formerly referred to as Vulnerable) - A species with characteristics that make it sensitive to human activities or natural events.

This Ring-necked Snake was found in the lower Humber watershed in the summer of 2011. This is the first record of this species in Toronto for more than 25 years!
photo: TRCA

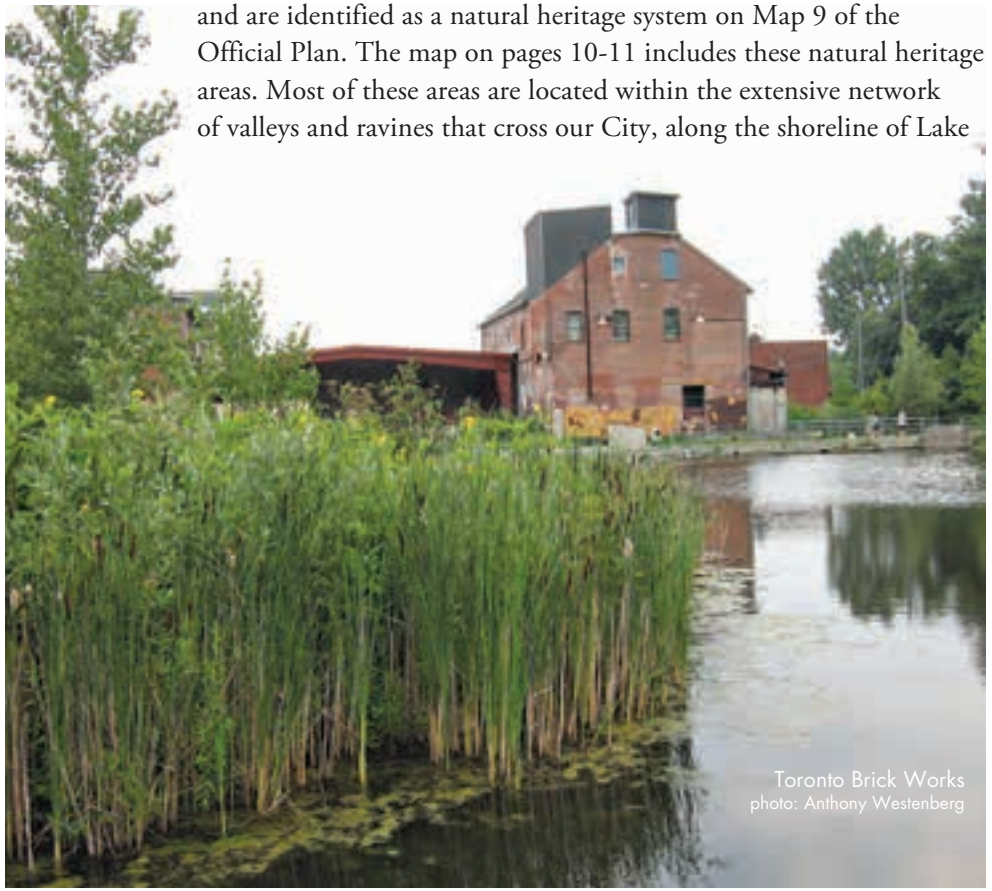


Local Policy Initiatives

City of Toronto

Protecting and enhancing the natural environment and biodiversity is a high priority for the City of Toronto. The Official Plan is the City's guiding land use planning document. It protects important natural areas and functions, supports biodiversity and requires that the natural environment be taken into account as part of our city building activities.

Toronto's natural heritage features and functions have been mapped and are identified as a natural heritage system on Map 9 of the Official Plan. The map on pages 10-11 includes these natural heritage areas. Most of these areas are located within the extensive network of valleys and ravines that cross our City, along the shoreline of Lake Ontario and in Rouge Park, and are protected by zoning and land use designations. These areas provide habitat for a wide variety of native plants and animals and help sustain local biodiversity. When new development is proposed in or near the natural heritage system, the proposed development's impact must be evaluated and measures must be identified to protect and improve the system and mitigate negative impacts.



Toronto Brick Works
photo: Anthony Westenberg

Good stewardship supports and enhances biodiversity. The Ravine and Natural Feature Protection Bylaw protects forests and valley slopes by regulating removal of trees and changes to grade. The City also undertakes a wide range of stewardship activities in parks and natural areas, often in partnership with other agencies, institutions and community groups. Examples include control of invasive species in ravines and woodlands; naturalization programs; tree planting events; ecological enhancement of existing habitats; creation of new habitats such as wetlands and meadows; and restoration of rivers and streams.

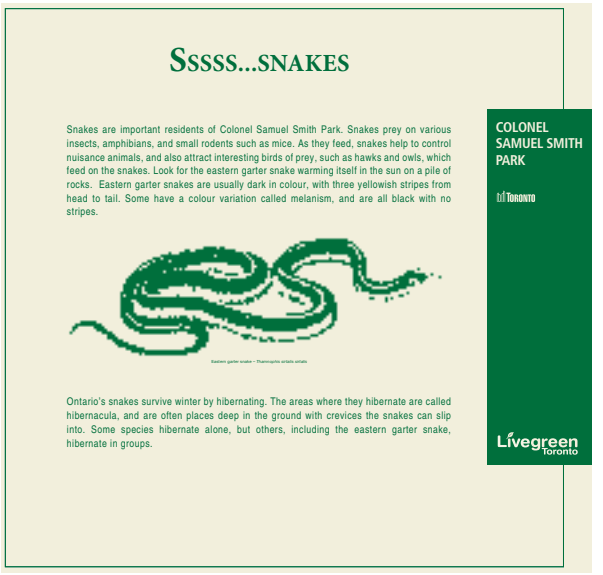
Initiatives are under way to reduce the impact of the built environment on biodiversity and the natural environment. Toronto's *Bird-Friendly Development Guidelines* and the "Lights Out Toronto!" campaign identify building design and lighting strategies that reduce migratory bird deaths. The Green Roof Bylaw is creating green spaces on rooftops that support insects and some birds and have the potential for further biodiversity enhancements. The Toronto Green Standard, which all new development applications are required to meet, includes performance measures that help preserve the urban forest, encourage tree survival and growth, and ensure native species are planted. Collectively, all of these actions are designed to reduce the impact of our city building activities on the natural environment and help protect biodiversity.

City of Toronto Parks, Forestry & Recreation

Through their restoration work in Toronto's parks and ravines, the City's Urban Forestry section of Parks, Forestry and Recreation has contributed to the protection of amphibian and reptile habitat. By protecting, restoring and enhancing existing natural areas as part of the Parkland Naturalization Program, amphibians and reptiles have more of the habitat they need to survive in the City of Toronto. Some of the actions that have contributed are:

- improving shorelines around ponds for habitat
- creating, maintaining, and restoring wetlands for habitat
- naturalizing pond and forest ecosystems to accommodate habitat for the different stages of amphibian and reptile life cycles
- constructing snake hibernacula
- monitoring through the Community Stewardship Program and by professional biologists to plan for future habitat enhancements and to assess existing habitat

The results are that you may find Snapping Turtles laying eggs near restored ponds in the Don Watershed; Common Gartersnakes using hibernacula in the Highland Creek where natural design has replaced concrete channels; a chorus of Green Frogs singing in the East Don Parklands; and Painted Turtles basking on rocks in ponds in the Humber River watershed.



You can learn about amphibians and reptiles through the educational component of Urban Forestry's programs when you come to volunteer to plant aquatic plants in a wetland or when you stop to read our interpretive signage. Toronto's parks and ravines are alive with amphibians and reptiles if you just know where to look!

Discovery Walks is a program of self guided walks that link city ravines, parks, gardens, beaches and neighbourhoods. Informative signage will help you experience an area's natural and social history.

Discover Your City by Taking a Walk!
for more information about Discovery Walks go to http: toronto.ca/parks/trails/discover/htm

Toronto Zoo

Toronto Zoo has many conservation programs that serve to protect rare species and habitats globally. Some of these focus specifically on the preservation of local amphibians and reptiles. The Zoo has also collected data on the distribution of amphibians and reptiles in Toronto for over 30 years.

Adopt-A-Pond Wetland Conservation Programme (AAP) – provides youth, educators, landowners and community groups with resources and opportunities to conserve, restore and protect wetland habitats and wildlife. Adopt-A-Pond engages communities in reptile and amphibian stewardship through habitat preservation projects such as the construction of turtle nesting beaches, snake overwintering sites or restored wetland habitats. Many resources are available through the programme including: identification guides and posters of the amphibians and reptiles of Ontario, frog call CDs, turtle and snake crossing signs for roadways, curriculum packages related to wetland, turtle and snake conservation, and fun, interactive video games to promote conservation in the classroom.
Visit www.torontozoo.com/AdoptAPond to learn more.

The Zoo hosts three citizen science programs that encourage the public to share their knowledge of local animals and habitats with conservation biologists to promote protection of species and habitats at risk. These are: Ontario Turtle Tally, FrogWatch Ontario and the Wetland Guardians Registry.

Turtle Island Conservation (TIC) – partners with First Nations communities to preserve community knowledge and significant natural and cultural landscapes. The program recognizes and records significant landscapes valued by First Nations communities and integrates traditional ways of knowing with western science to monitor, protect, respect and restore landscapes that are important to all of nature's animals, including reptiles and amphibians. TIC offers amphibian and reptile identification guides and turtle crossing signs in Mohawk, Ojibway and English. Visit www.torontozoo.com/conservation/tic.asp for more information.

Species Recovery Programs – Toronto Zoo assists Canadian amphibian and reptile recovery teams by providing stewardship, research, habitat restoration and, where requested, genetically managed assurance populations for small populations threatened with extinction. Some species the Zoo is currently working with include: Cricket Frogs, Fowler's Toads, Chorus Frogs, Oregon Spotted Frogs, Dusky Salamanders, seven turtle species from Ontario advocated by the Ontario Multi-Species Turtle at Risk Recovery Team, Massasauga Rattlesnakes, Foxsnakes and Hog-nosed Snakes. The Zoo also participates in head-starting programs for two species of Canadian turtles that do not occur in Ontario. Working with partners at Parks Canada and the Ontario Ministry of Natural Resources, hatchling species of At Risk Turtles are raised at the Toronto Zoo until they are big enough to avoid predation and released back into the wild.

Fowler's Toad
photo: Royal Ontario Museum

Ontario Nature

Ontario Nature was established in 1931 to protect Ontario's nature through research, education and conservation action. Ontario Nature champions woodlands, wetlands and wildlife, and preserves essential habitat through its own system of nature reserves. Ontario Nature is a charitable organization representing over 30,000 members and supporters and over 140 member groups across Ontario.

While provincial in scope, Ontario Nature is located in Toronto and many of its programs take place in Toronto. Ontario Nature works with inner city youth to help connect them to the natural world.

Especially pertinent to this book is the Ontario Reptile and Amphibian Atlas. Ontario Nature engages the community and other conservation groups to submit observations of any reptile or amphibian species. Ontario Nature uses this data to inform public policy, protecting species at risk by sharing data with the Ministry of Natural Resources and creating profiles for all of Ontario's species and subspecies. These profiles contain information about each animal's biology and identification, as well as range maps created with the data contributed by people like you.

Urban Turtle Initiative
Toronto Zoo staff have been researching turtle populations and habitats in the Rouge Valley since 2003, collecting information on movement and habitat use of three GTA species at risk: Blanding's Turtles, Northern Map Turtles and Snapping Turtles. This research has identified critical areas where wetland protection or restoration projects can benefit Species at Risk turtles and is used to manage important turtle landscapes in the Rouge River watershed.

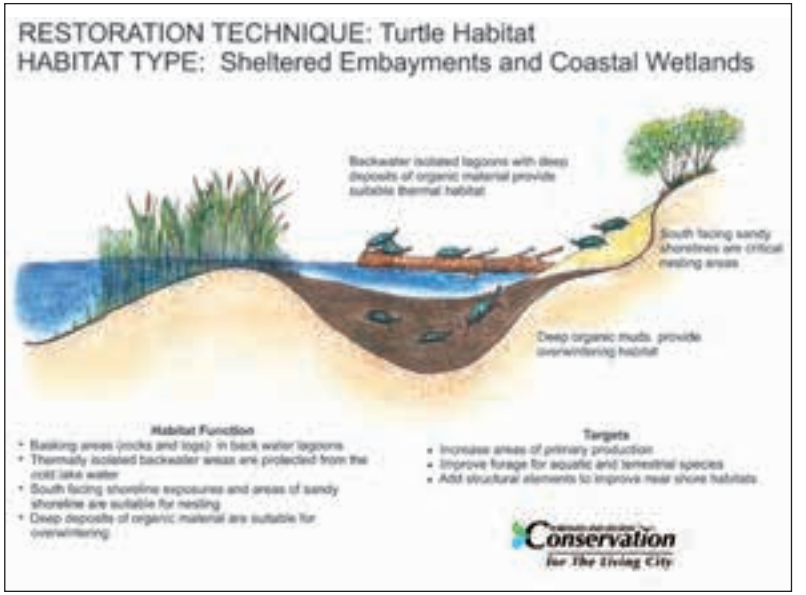
Toronto and Region Conservation

for The Living City

TRCA implements a variety of projects and programs centered on wetland restoration, monitoring and education. Wetland restoration and targeted wildlife habitat creation is a core focus. Wetlands not only help mitigate floods, they provide critical habitat for amphibians and turtles, and the associated riparian area also benefits snakes and other wildlife. Restoration projects that target habitat for amphibians and reptiles include fishless wetlands to minimize egg and tadpole predation, hibernacula for overwintering snakes, and turtle basking mounds and nesting areas.

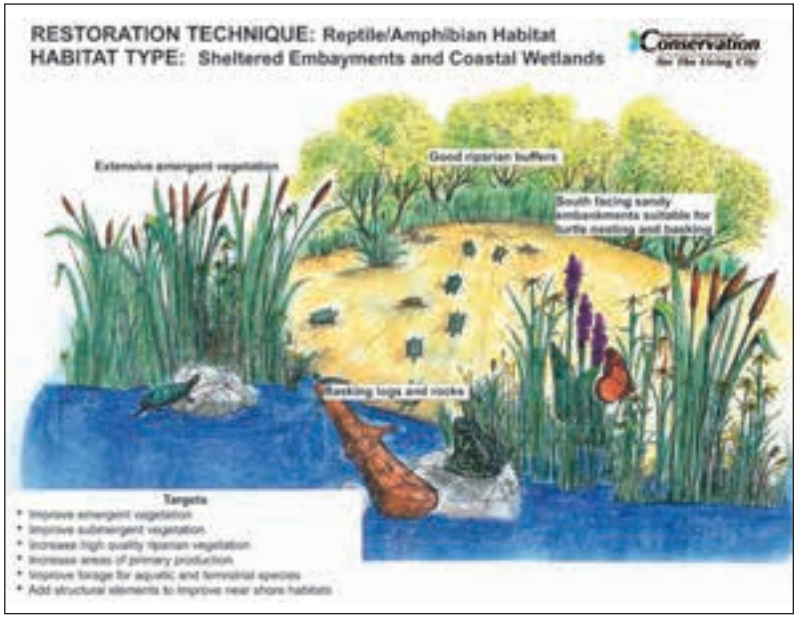
The Terrestrial Natural Heritage Program identifies the region's critical network of natural areas by inventorying habitats, as well as the species that use those habitats, and prioritizes areas for protection and restoration. Interested citizens can become involved in this work as volunteers with the TRCA's Terrestrial Volunteer Monitoring Program. This long-term monitoring project trains volunteers to recognize the calls of the frog species that occur in the region, and to conduct annual surveys for them at one of the program's monitoring sites in the Toronto area.

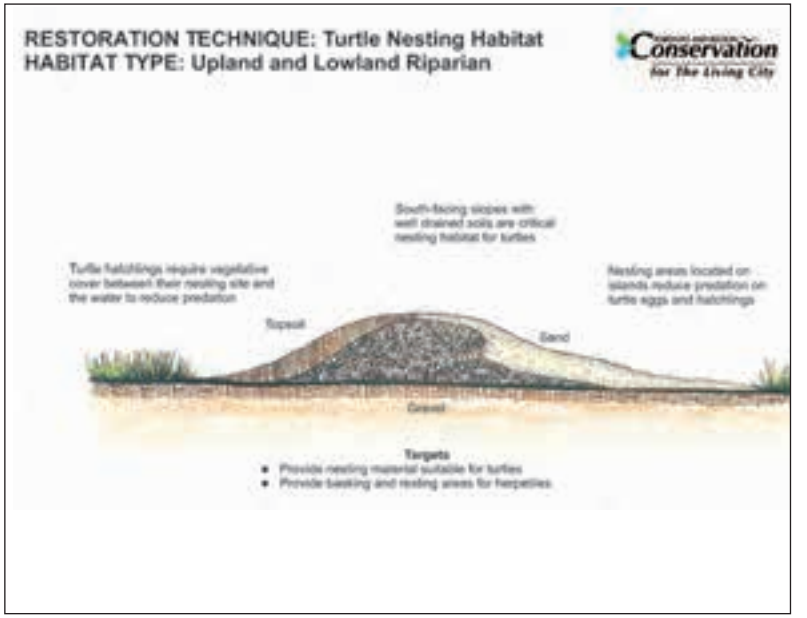
TRCA also supports the Ontario Road Ecology Group, Toronto Zoo and our municipal partners to train "citizen scientist" volunteers. These volunteers are learning to monitor and collect data regarding frog, turtle and snake casualties along our roads that bisect their natural habitat. In addition, trained instructors deliver free elementary school programs related to frogs, toads, salamanders and snakes. Wetland Ecosystems, Pond or Stream Study and the Aquatic Plants Program provide children with a hands on opportunity to create wetland and shoreline habitat.



For more information on TRCA's educational programs please visit: www.trca.on.ca/school-programs

For more information on TRCA's volunteer programs please visit: www.trca.on.ca/get-involved/volunteer





Eastern Red-backed Salamanders – this species is abundant in our forests. Research on populations in the United States reports that the species' biomass is greater than that of mammals and birds combined in eastern forest ecosystems such as the ones we have in Toronto. Due to the important ecological role salamanders play, the TRCA now includes abundance surveys for the Eastern Red-backed Salamander in their Long Term Monitoring Project.

Eastern Red-backed Salamander
photo: Paul Prior

How You Can Help

Backyard projects to attract Toronto's reptiles and amphibians

One of the most rewarding ways to increase the natural value and visual appeal of your property is to consider ways to attract wildlife and share your urban space with the abundance of life around you. Who knows, your yard could be the corridor that some species depend on to move from one spot to another. Attracting amphibians and reptiles to your yard will offer endless opportunities to enrich your life, and help to maintain a healthy balance of insects on your property. There are a few simple projects you can undertake that are beneficial to Toronto's amphibians and reptiles, and at the same time, will turn your yard into a sanctuary for all those who visit.

Think of small creatures when maintaining your property

- If you choose to cut the grass on your property, do so using the inside-out technique. Allow small animals like reptiles and amphibians a chance to escape your mower's blades by cutting the innermost portion of your lawn first and working in a circular pattern towards the perimeter.
- Let some areas of your property grow naturally. Tall grass and foliage close to the ground offers small creatures feeding areas and hiding places to escape from predators.
- Place lawn edging around window wells and pool fences to prevent small amphibians from falling into these death traps. Placing rocks or logs around the inside edges of dangerous pitfalls will ensure that tiny animals can escape.
- Avoid using pesticides and herbicides – these chemicals are easily absorbed by amphibian skin and can be fatal for many small animals.

Naturalize your backyard

Plant native vegetation. Spruce up your garden and lawn by planting a variety of indigenous species that will attract insects that are prey items for reptiles and amphibians. Avoid using pesticides and chemical treatments on your lawn to keep your soil healthy.

Build a backyard pond

Water features that include vegetation and natural elements may successfully attract amphibians, reptiles and their prey. To create the best possible habitat ensure that the water feature has direct sunshine for at least part of the day (4 hrs), and hiding places for animals to escape from predators. Adding fish to a pond can be nice, but be aware that fish will consume frog eggs. Do not add chlorine to control algae, or pesticides and bacteria to control mosquito larvae, as these will be absorbed into the skin of any amphibian that visits your pond.

Backyard pond
photo: Bob Johnson

Provide refuge for amphibians and reptiles

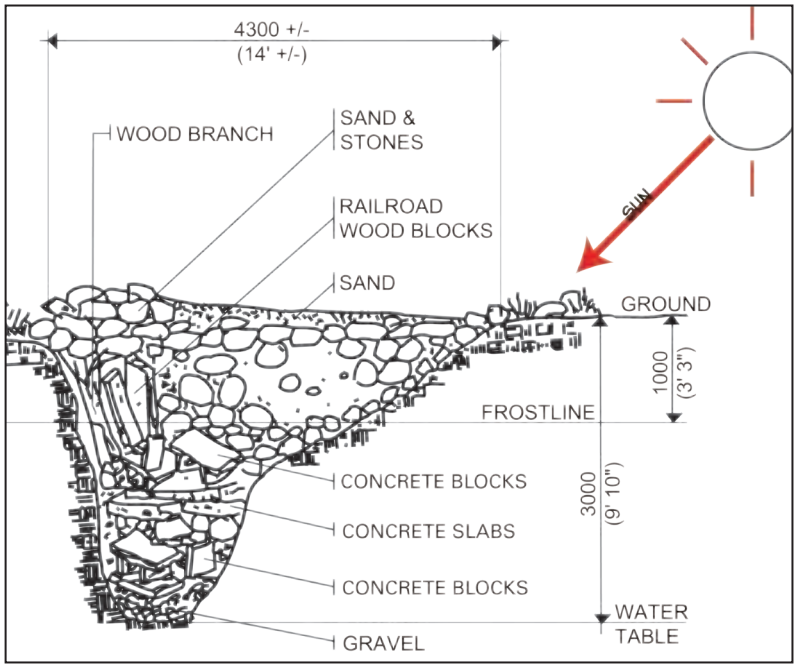
Toad abodes – To attract toads to your property provide cool, moist, dark places where they can seek refuge on warm days. An overturned flower pot with a hole drilled at the lip or a few rocks or logs piled together to produce a tiny cave will give toads a hiding spot, and encourage critters in your garden that will eat unwanted garden pests such as slugs.

Hibernation havens – Amphibians such as Gray Treefrogs, Wood Frogs and Spring Peepers love to overwinter in leaf litter piled on your property. Similarly, log piles, compost heaps and stone loads are used as overwintering grounds for many reptile and amphibian species. You can provide winter refuges for animals on your property simply by keeping these things around.

Build a snake hibernaculum – Snakes need warmer places to stay in the winter, and often take refuge in exposed bedrock, stone walls or in holes filled with stone. To keep them out of your basement or attic, consider building an outdoor shelter for overwintering snakes.

Seven steps to building your own hibernaculum:

1) Select a site with good sun exposure.
2) Your snake hibernaculum can vary in size, but it must be deeper than the frost line (at least 2 m deep).
3) Snakes prefer an overwintering site close to the water table. Moist air ensures that snakes do not dehydrate over the cold and dry winter months.
4) Place rubble in the bottom to create many chambers for the snakes. Using construction rubble reduces the use of valuable landfill space, and reduces the need for limited supplies of quarry stone. Chambers created at different depths allow the snakes to select the temperature they prefer, and ensures that they climb up if the bottom of the pit is flooded with water.
5) As you fill the pit, ensure that a tunnel extends down to the bottom of the pit at each of three corners. Snakes use these passage ways to move to the bottom of the pit and into the underground chambers.
6) Be sure that you leave an entrance opening for the snakes at each of your three corners. Cap with an insulating layer of sand and stone.
7) Place logs and stones near entranceways to provide cover for snakes.



Snake hibernaculum. Measurements are in metric above or to the left and imperial below or to the right of the lines.
Illustration: Toronto Zoo

Protect Toronto's natural habitats

It is important to remember that even within such a large city, our actions can dramatically affect nature. There are a few ways we can help to protect Toronto's natural habitats.

Respect Nature

Reptiles and amphibians are especially vulnerable to human activities and disturbance. Always stay on trails to avoid trampling reptile and amphibian habitat and be cautious when travelling trails – there may be basking reptiles! Moving rocks, logs, fallen leaves and other natural features can directly harm individuals that may be living in, on or under these items, so it's best to leave these items in place. Additionally, never plant in natural areas unless it is part of an approved naturalization plan. Sometimes the introduction of plants, even native species, can damage habitat, especially reptile nesting areas that may appear to lack vegetation. It's best to leave nothing behind and take nothing with you – including reptiles and amphibians! While they may be fun to catch and interesting to look at, when you remove an animal from its home, even for a short time, you impair its ability to survive by causing unnatural stress and taking it away from essential activities, like foraging, basking and mating. You may also cause direct harm, especially to amphibians, which have very porous skin that absorbs harmful chemicals in hand lotion, sunscreen and insect repellent.

Participate!

You can directly help amphibians and reptiles by picking up litter - this is important everywhere, not just in natural areas, as storm sewers carry refuse to frog and turtle habitat. Frogs and turtles are easily entangled in garbage like plastic bags, which can kill them if they

The City of Toronto's **Wet Weather Flow Master Plan** (WWFMP) is a long-term, multi-billion dollar initiative launched in 2003. WWFMP projects are successfully improving the water quality and aquatic habitat in the City's streams and waterfront by reducing and collecting contaminated stormwater run-off. Combined sewer overflows are being intercepted and stored in massive underground tanks before treatment at wastewater plants. Sewer-Use By-Law Officers investigate and eliminate illegal discharges and cross connections (sanitary connections to the storm sewer). Numerous stream restoration projects are underway to reduce destructive erosion and improve aquatic habitat. And stormwater ponds are being built to collect and naturally treat wet weather flows. These ponds also help control the volume and velocity of stormwater entering the streams. This reduces the erosion and flushing of fish habitats, and provides aquatic and terrestrial habitat within the stream valleys once natural and planted vegetation takes hold. www.toronto.ca/water/protecting_quality/wwfmmp/index.htm

Stormwater Management Wetland in High Park
photo: Vicky Shi, Toronto Water

cannot reach the surface to breathe. Set an example for others by picking up litter when and where you see it, or organize a cleanup in your community.

Natural areas, even small spaces, are important habitats in urban settings. Get involved in their conservation by attending public meetings about development and land use planning to tell officials they need to be protected.

Attend a reptile and/or amphibian workshop or event
Learning more about these fascinating creatures will help you appreciate them more and help in their conservation. The Toronto Zoo hosts the Spring Toad Festival every year on the last weekend of April or the first weekend of May (www.torontozoo.com/adoptapond). They also celebrate World Turtle Week on the third week of May, which focuses on species at risk.

Consider volunteering or donating to wildlife rehabilitation centres that help care for injured reptiles and amphibians. The Toronto Wildlife Centre is a charity dedicated to wildlife rehabilitation and has experience dealing with most reptile and amphibian species found in Ontario (www.torontowildlifecentre.com).

Join a nature walk where you can learn more about native reptiles and amphibians; the Toronto Field Naturalists hold regular walks in Toronto's natural spaces (www.torontofieldnaturalists.org).

"Civilizations began around wetlands; today's civilization has every reason to leave them wet and wild." – Edward Maltby

Engage in citizen scientist projects

Report your sightings of reptiles and amphibians to help scientists track distributions and inform species at risk conservation. The Ontario Turtle Tally and Frogwatch-Ontario depend on volunteers to report observations to help identify important areas for protection or restoration (www.torontozoo.com/adoptapond). Bird Studies Canada runs the long-term, volunteer based Great Lakes Marsh Monitoring Program to collect information on breeding amphibians (www.bsc-eoc.org). Ontario Nature maintains the Reptile and Amphibian Atlas for the province and relies on volunteers to submit their sightings (www.ontarionature.org). Observations of amphibians and reptiles on the road (dead or alive) should be submitted to the Ontario Road Ecology Group (www.wildlifeonroads.org).

If you live near water, you can help improve habitat for amphibians and reptiles by:

- Adding fallen wood or basking logs to water bodies to provide a place for reptiles such as turtles to bask, or leaving downed trees where they fall in the water.
- Keeping your shoreline natural and avoiding building hardened shoreline structures that render habitat unusable for wildlife.
- Leaving a 10-30 m wide buffer zone of natural vegetation next to all shoreline areas to filter run-off, reduce disturbance to wetland creatures and provide hiding places where small creatures can protect themselves from predators.
- Constructing basking areas for reptiles or a nesting beach for turtles near your shoreline.
- Building docks and access structures that allow wildlife freedom of passage. For example, floating or cantilever docks are better than solid structure docks that interrupt natural shoreline habitat and travel ways for wildlife.

Children learning about reptiles and amphibians in wetlands.
photo: Antonia Guidotti

Invading and introduced species

Buy native plants for backyard ponds as well as for your garden. Reputable native plant nurseries will locally source seeds. These plants will not only support native wildlife, but will require little in terms of care, and do not pose any risks when seeds disperse into other green spaces. Unfortunately, many invasive plants, such as European frogbit are still sold in the water garden trade, so if you do buy exotics, research the plants before you purchase them. In addition, overwinter your aquatic plants indoors or properly dispose of them in the garbage, not the green bin, at the end of the season if they are non-native. Remember to never dispose of aquarium water into the environment. Aquarium plants may invade wetlands and new diseases may be introduced to the environment.

Never move plants or animals. It can be tempting to bring a plant or even tadpoles home from the cottage to put in your local wetland, and when a species is native it can seem especially harmless. However, even a "native" species can have different genetic populations, and it is best to keep these populations where they would naturally be found. The removal of plants and animals from other areas outside of Toronto can have a negative impact on those source populations, and while the removal of "only a few" may seem insignificant, such actions are detrimental to population sustainability and may be illegal in Ontario. Last, but not least, moving plants and animals from one area to another has the potential to introduce disease. The chytrid fungus, likely responsible for the extinction of many frog species around the world, is an example of the terrible impacts that the introduction of disease may have on our environment.

Roads

The Ontario Road Ecology Group (OREG) protects biodiversity from the threats of roads. You can help prevent a wildlife/vehicle collision by following these helpful tips:

- Limit driving (particularly at dawn and dusk when wildlife is on the move).
- Take alternate modes of transportation.
- Plan efficient routes.
- Drive with caution, especially on roads bisecting wildlife habitat.
- Obey speed limits to increase reaction time to avoid a wildlife/vehicle collision.
- Watch for wildlife crossing signs.
- Use sufficient lighting to maximize visibility.
- Leave a safe following distance between vehicles.
- Do not litter food items that attract wildlife to the road.
- Provide feedback on local road projects.
- Move wildlife off the road when it is safe.
- Report any wildlife observed on the road to OREG www.wildlifeonroads.com

Note: Wildlife move more at dawn so be alert and drive cautiously. Being a responsible driver gives you the opportunity to react and avoid a wildlife/vehicle collision.

Moving wildlife off the road

Use good judgment and secure your safety and the safety of other motorists. If a situation is unsafe, call a local wildlife handler or animal shelter for assistance. A pylon or flare placed near the animal will help alert passing motorists and may avoid further damage. Most reptiles are safe to handle. If in doubt, use a stick or a car mat to gently encourage wildlife off the road. Never lift a turtle or hold a snake by the tail; this could harm the handler and the animal. Always move a turtle in the same direction it was heading. When touching amphibians, ensure your hands are free of sunscreen, insect repellent, lotions and anti-bacterial cleansers to avoid irritating their sensitive skin.

Moving a turtle off the road
photo: Bob Johnson

The old man
Must have stopped our car
two dozen times to climb out
and gather into his hands
the small toads blinded
by our lights and leaping, live drips of rain.

The rain was falling
a mist about his white hair
and I kept saying
you can't save them all,
accept it, get back in
we've got places to go.

But, leathery hands full
of wet, brown life
knee deep in the summer
roadside grass,
he just smiled and said
they have places to go too.

- Joseph Bruchac

Recreation

Recreation is vital to our city. To ensure that time spent outdoors is in harmony with nature:

- Cycle with caution - hard to see reptiles and amphibians may be on the path
- Keep pets on a leash and clean up after them
- Confine mowing to playing fields
- Don't build rock sculptures or structures that disturb wildlife habitat
- Fish responsibly and do not leave behind hooks, line or gear
- Watch for swimming or surface basking turtles while boating

Northern Map Turtle injured by boat
photo: Marie Andree Carriere

Conclusion

Torontonians are likely well aware that as Canada's most populated city, there is significant urban development in Toronto, much of it to the detriment of our natural areas. However, many of us are likely unaware of the vast amounts of natural areas that still exist here, despite this development. Much of this natural space includes habitat for amphibians and reptiles.

Toronto features close to 5000 hectares of natural areas in the city's regional park system that includes seven provincially significant wetlands. The city is also home to a portion of one of the world's largest urban parks, Rouge Park, which encompasses another 4200 hectares. The diversity of amphibians and reptiles featured in this book are able to survive in Toronto's urban landscape because of these protected areas.

However, Toronto continues to experience large population growth and significant urban development. As residents of this large city we must realize the delicate balance between our city's need for growth and the need to retain the natural spaces that we desire and that native wildlife requires.

Habitat loss and fragmentation pose the greatest threat to reptiles and amphibians in Toronto. Many of Toronto's amphibian and reptile populations lack sufficient habitat to keep their populations here indefinitely. These populations rely largely on the movement of individuals from areas outside of the city's limits. Any increase in naturalized areas within the city and, equally important, the corridors between these areas, will help to maintain Toronto's amphibian and reptile populations. In fact, these same corridors may provide a path for our extirpated species to find their way back.

photo: Calvin Knaggs

Stewardship initiatives, like this publication and programs mentioned in these pages, give us the tools and opportunity as residents to get involved. All of us play an important role in educating and promoting an appreciation for the wildlife with which we share our city. Together, we can encourage appreciation of amphibians and reptiles while highlighting their importance in our urban ecosystem.

By working together to save amphibians and reptiles we can enhance our existing biodiversity in Toronto, encourage the return of currently extirpated species and ensure that our "common" species remain common.

Select Reptile and Amphibian Resources

If you witness cruelty to wildlife or suspect illegal hunting or poaching practices you can report it to:
OSPCA: 1-888-ONT-SPCA (668-7722)
Ministry of Natural Resources: 1-877-TIPS-MNR (847-7667)
Crime Stoppers: 1-800-222-TIPS (8477)

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Joseph T. Collins, Roger Conant 1998 A Field Guide to Reptiles and Amphibians: Eastern and Central North America. Houghton Mifflin Harcourt. [ISBN 10:0395904528]

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Larval Amphibians of Ontario identification guides. Toronto Zoo Adopt-A-Pond Programme. Available in English and French.

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Life in cold Blood. 2008 BBC Video ASIN: B0018F0QS2

Reptiles and Amphibians 2010 National Geographic. ASIN: B004FN26IM

SOFTWARE

The Digital Frog 2.5 Virtual frog dissection, anatomy & ecology, Version 2.5a | Windows & Macintosh: www.digitalfrog.com

PERIODICALS
Froglog: www.amphibians.org/ASG/Publications

WEBSITES

Greater Toronto Area Reptile and Amphibian Resources
Frog Watch: www.naturewatch.ca/english/frogwatch/on/intro.html

Little RES-Q: www.littleresq.net/# (A turtle adoption centre)

Turtle Haven: www.turtlehaven.ca/ (A turtle adoption centre)

Ontario/Canada Resources
Canadian Amphibian and Reptile Conservation Network: www.carcnet.ca

Great Lakes Marsh Monitoring Program:
www.bsc-eoc.org/volunteer/glmmp/index.jsp

Ontario's Reptile and Amphibian Atlas:
www.ontarionature.org/protect/species/herpetofaunal_atlas.php

Parks Canada, Species at Risk: www.pc.gc.ca/eng/nature/eep sar/index.aspx

Adopt-A-Pond: www.torontozoo.com/Adoptapond/speciesguides.asp

Ontario's Reptile and Amphibian Atlas:
www.ontarionature.org/protect/species/herpetofaunal_atlas.php

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Frog Watch: www.torontozoo.com/AdoptAPond/FrogwatchOntario.asp

Ontario Turtle Tally: www.torontozoo.com/AdoptAPond/TurtleTally.asp

Wetland Guardians: www.torontozoo.com/AdoptAPond/
WetlandGuardiansRegistry.asp

Natural Heritage Information Centre: http://nhic.mnr.gov.on.ca

Biodiversity: Explore Ontario's Species: www.mnr.gov.on.ca/en/Business/
Biodiversity/2ColumnSubPage/STEL02_166890.html

Ontario Nature: www.ontarionature.org

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Wetland Curriculum. Toronto Zoo Adopt-A-Pond Programme:
www.torontozoo.com/AdoptAPond/WetlandCurriculum.asp

Rattlesnake Curriculum. Toronto Zoo Adopt-A-Pond Programme:
www.torontozoo.com/AdoptAPond/RattlesnakeCurriculum.asp

Kids for Turtles: www.kidsforturtles.com

Turtle Rescue Centres
Kawartha Turtle Trauma Centre: www.kawarthaturtle.org

Turtle Shell Tortue: www.turtleshelltortue.org

Turtle Haven: www.turtlehaven.ca

OSPCA: www.ontariospca.ca/4-wildlife-rehab.shtml

Little Ray's Reptile Zoo: http://raysreptiles.com

The Indian River Reptile Zoo: www.reptilezoo.org

North American Web Resources
Tadpoles of the United States and Canada: A Tutorial and Key:
www.pwrc.usgs.gov/tadpole

Center for North American Herpetology: www.cnah.org

Toronto Zoo: www.torontozoo.ca

Save the Frogs: www.savethefrogs.com

International Web Resources
Amphibia Web: www.amphibiaweb.org

Amphibian Species of the World 5.5, an Online Reference: http://research.amnh.
org/vz/herpetology/amphibia/index.php

IUCN Amphibian Specialist Group: www.amphibians.org/ASG/Home.html

Tree of Life Project: http://tolweb.org/tree

The Reptile Database: www.reptile database.org

Encyclopedia of Life: http://eol.org

Arkive: images of life on earth: www.arkive.org

Frog Life: www.froglife.org/justaddwater

Amphibian Ark: www.amphibianark.org

Reptile and Amphibian Ecology: www.reptilesandamphibians.org/news/emails/
RAEI_online_no1.2.html

Responsible Reptile Pet Ownership (and suitable reptile pets):
www.scisnake.com/features/pets.html

Video Games
www.torontozoo.com/AdoptAPond/AtRisk.asp

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Partners

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Ontario Road Ecology Group: **www.wildlifeonroads.org**
Royal Ontario Museum: **www.rom.on.ca**
Toronto Field Naturalists: **www.torontofieldnaturalists.org**
Toronto and Region Conservation: **www.trca.on.ca**
Toronto Zoo: **www.torontozoo.com**

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Wallace Edwards (images courtesy of Toronto Zoo's Adopt-A-Pond Programme)

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- Toronto and Region Conservation's Paddle the Don Fund: **www.paddlethedon.ca**

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