

# High Park

Restoring  
a Jewel  
of  
Toronto's  
Park  
System





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# **High Park: Restoring a Jewel of Toronto's Park System**

## **Restoration Strategies for High Park**

Written by Joanna Kidd, LURA Consulting, Tove Christensen and Beth McEwen,  
Forestry, Parks and Recreation Division, City of Toronto, 2000

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On May 13, 1992, the Department of Parks and Recreation tabled a report before Toronto City Council describing the significance of High Park's natural environment and the importance of its cultural and recreational amenities in serving local and regional needs. This report served to initiate subsequent study of the oak woodlands and shoreline rehabilitation around Grenadier Pond. Directors Mario Zanetti and Susan Richardson, and Manager Murray Boyce from the Parks and Recreation Department initiated and implemented most of the restoration work in the park prior to 1998. The Native Plant Production Program at High Park Greenhouse, led by Arthur Beauregard, and Park Operations, led by Carol Guy, also supported the restoration program through its early stages. The Toronto and Region Conservation Authority has greatly contributed to the restoration of Grenadier Pond. The Ontario Ministry of Natural Resources conducted the first small-scale prescribed burns in the park and Steve Varga has provided documentation to update the rare plant species inventory. Fred Bruin has made a significant contribution to the prescribed burn management program in High Park.

Ongoing restoration of the natural areas of High Park is the responsibility of the Forestry and Natural Environment section, under the direction of Richard Ubbens and the management of Beth McEwen. The program is supported by a Restoration Crew, working in cooperation with High Park Greenhouse and Park Operations staff. The High Park Community Advisory Council, High Park Initiatives, Friends of High Park and their members and volunteers work with Park's staff in many areas of resource management. In particular, the Volunteer Stewardship Program and the High Park Nature Centre, two programs sponsored by these community organizations, focus on restoration activities. The dedication of all staff and community volunteers in maintaining and revitalizing the park's natural environment continues to play a key role in ensuring the success of the ongoing restoration efforts.

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*Wild lupines in the oak woodland.*



Gera Dillon



## AN INTRODUCTION TO THE PARK

Each year, over a million people visit High Park. Some come only once a year, to delight in the display of cherry blossoms or see a play performed in a spectacular outdoor setting. Others come daily, to walk their dogs or jog along woodland trails. Some people come for active pursuits – soccer, tennis or cycling – and others to relax and enjoy a leisurely walk. Picnickers come to socialize with family or friends, while birdwatchers come to quietly observe wildlife.

In terms of its natural resources, High Park is a unique and precious place. It contains some of the City’s most significant natural areas and an outstanding concentration of rare plant species. The most famous, and most admired plant communities in the park are its oak savannah – a remnant of the sand prairie systems that once covered much of the southern Ontario landscape. The experience of walking through High Park’s black oak savannah amidst a blaze of wildflowers and swaying grass plumes is one that cannot be duplicated anywhere else in the Greater Toronto Area.

High Park is undeniably one of the jewels of Toronto’s park system. It provides Toronto’s residents and visitors with a wide range of recreational opportunities in a beautiful and unique landscape. Its size – 161 hectares (400 acres) – is big enough to provide us with a sense of wilderness within the bustling city. Centrally located, it is easily accessible by foot, bicycle, car and public transit. It offers year-round attractions, is well-maintained and has fine amenities.

Since its establishment in 1873, High Park has played a central role in Toronto life. It is easy to think that it will always be there for us to use. But we now know this cannot be taken for granted. Some of our actions have endangered and degraded the park’s forests, meadows, wetlands, ponds, creeks and wildlife. If we want our grandchildren to enjoy the park’s beauty as much as we have, we need to protect and restore its natural areas. That is what this booklet is about.

This booklet describes the very special and beautiful natural areas that are found in High Park. It also outlines the management strategies that are being used to restore the park’s natural areas back to health.

### High Park Ecosystem Highlights

- Total park area 161 ha
- Total: 73 ha ANSI designated area
- Total: 79 ha terrestrial natural areas (22.7 ha black oak savannah, 32.3 ha woodland, including mix of significant oak woodland and disturbed woodland areas)
- Total: 24 ha aquatic environments (14.2 ha Grenadier pond)
- Total: 99 existing significant plant species (4 provincially rare, 9 regionally rare and 86 locally rare plant species)
- Total: 250 migratory bird species and a home for 48 breeding bird species, 6 butterflies of conservation concern, 19 species of mammals and 8 species of amphibians and reptiles



City of Toronto Archives

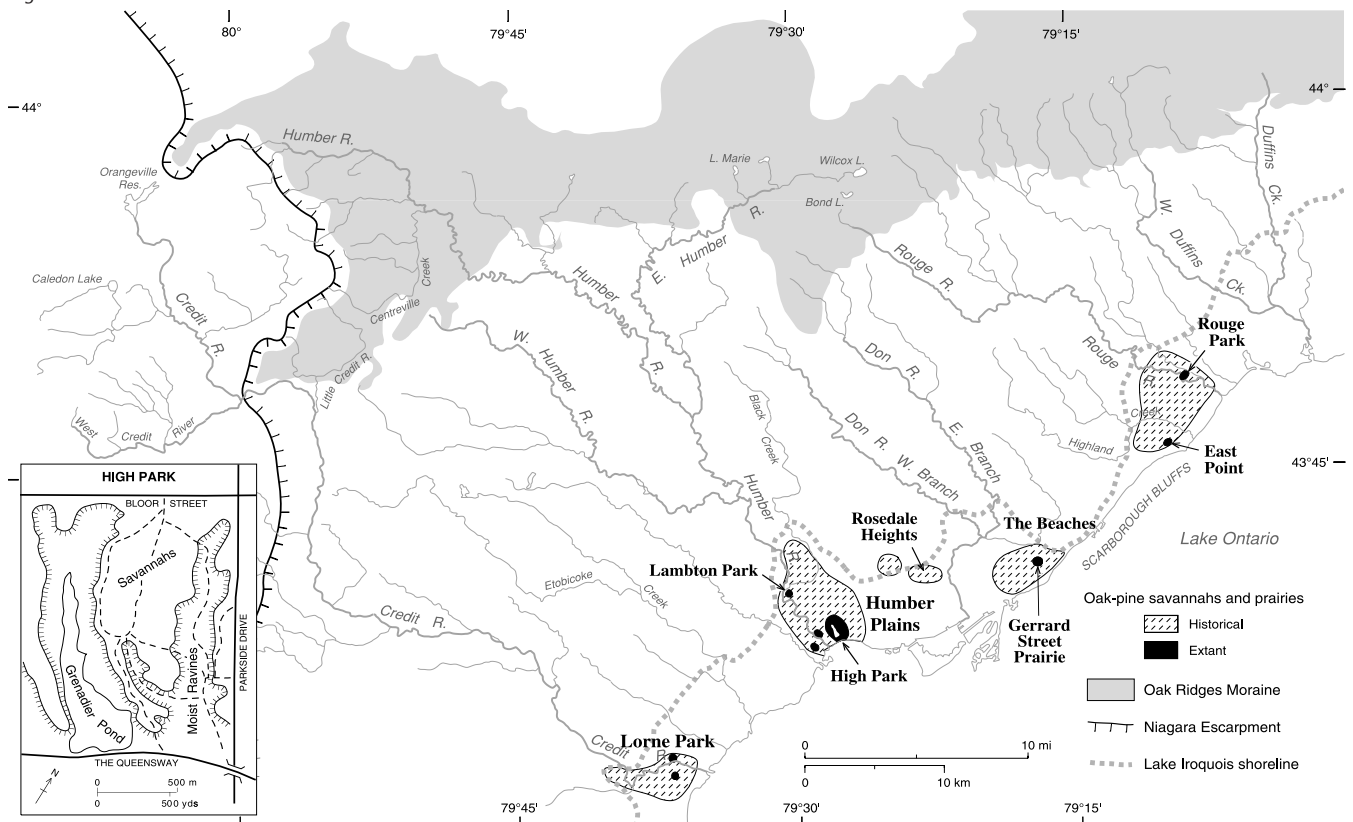
# A HISTORY OF HIGH PARK

## The Legacy of the Glaciers

The history of High Park begins with the last Ice Age, and its topography and soils are a legacy from that time. When the melting glaciers began their slow retreat to the north 12,000 years ago, they formed Lake Iroquois – a lake that was bigger and deeper than the present Lake Ontario – and deposited sands and silts on its bottom. These deposits form what is known today as the Iroquois Sand Plain. As temperatures continued to warm and Lake Iroquois shrank, glacial rivers began to flow across the plain's sandy soils. These carved the ravines that define High Park, formed an extensive web of streams and ponds, and left its flat and gently rolling uplands.

The vegetation that took hold in High Park was well-adapted to its topography, soils and watercourses. In the upland areas of the park, the well-drained sandy soils, southern exposure and dry microclimate encouraged the colonization of prairie and savannah plant communities. These communities – oaks with an understorey of grasses, wildflowers and low shrubs – were characteristic of the period 4,000 years ago when the climate was much warmer and drier than it is today. In the ravines and bottomlands, with their moister microclimates, forests and wetland communities took hold. These included mixed forests of oak, maple and hemlock, and water-loving shrubs, trees and marsh plants.

Figure 1. Historical and present locations of prairies and savannahs in the greater Toronto region.



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## Humans in High Park

Native peoples very likely used the High Park area when they settled in the Toronto region. Nearby, at the Humber River, a well-used trade route linked Lake Ontario and Georgian Bay, and another historic trail ran along the eastern side of Grenadier Pond. In the late 1600s, the Iroquois village of Teiaiagon flourished just northwest of the park, on the edge of the Humber valley. There is some evidence that natives cultivated corn on the sandy uplands of High Park, using fire as a tool to clear the land.

Lieutenant-Governor John Graves Simcoe founded the Town of York in 1793, and by the early 1800s the area around High Park was surveyed, divided and sold off. In 1836, City Surveyor John G. Howard purchased a 66.4 hectare lot and named the property “High Park”, as it was the highest point in the area. On a height of land overlooking Lake Ontario, he built a Regency-style villa, Colborne Lodge, as a home for him and his wife, Jemima.

The Howards deeded their property to the City in 1873 to be used by the citizens of Toronto as a public park. Two conditions of the bequest were that the Howards would receive annual pensions, and that they would continue to live in Colborne Lodge until their deaths. Howard lived until 1890 and saw his gift become a beloved public place. (The park was to be further expanded by the City’s purchase of lots to the east and west in 1876 and 1930.)

In keeping with the wishes of John Howard, High Park was intentionally left in an undeveloped, natural state. It quickly became a popular destination for Torontonians wanting to picnic, walk, snowshoe or toboggan in natural surroundings. Over time, however, important changes occurred, both inside and outside the park boundaries. West, north and east of the park, houses were built. South of the park, a rail and road corridor was constructed, disturbing the natural linkages between High Park’s ponds, marshes and creeks and Lake Ontario.

Within the park, public demand for active recreation fueled significant changes that began in the early 1900s. Trees were cleared to create space for playing fields and toboggan runs. Roads were laid out to improve access. Park managers started planting non-native trees and replacing the native groundcovers with turf grass. In the 1950s and 60s many major facilities were built, including Hillside Gardens, Grenadier Restaurant, and the swimming pool, fieldhouse and outdoor ice rink complex. Additional washrooms, picnic shelters, food concessions and parking lots were constructed, and major access roads were widened to accommodate increased volumes of traffic. All these changes increased the appeal, access and comforts of High Park. But they all came at a cost to the natural environment.

With its accessible location, natural features and diverse facilities, High Park continues to attract a multitude of visitors. As the population of Toronto grows and outdoor recreational activities such as running, cycling, dog walking, photography and nature study become more popular, the responsible stewardship of this valuable resource will continue to be a challenge in the years ahead.



Colborne Lodge



John

Toronto Culture.



Jemima

Toronto Culture.

## THE PARK'S NATURAL RESOURCES

### High Park's Significant Plant Species and Communities

#### What is an Oak Savannah?

*An oak savannah is a plant community with widely spaced oak trees and an understory dominated by grasses. With its characteristic open canopy, it has been described as "island-like stands of oaks in a sea of prairie". When the trees are denser (about 35% to 60% canopy coverage), it is called an "oak woodland". When trees are sparse or not present, it is called a "prairie".*

*Oak savannahs and woodlands exist in areas with low-nutrient, well-drained soils. They depend on periodic fires to create the conditions needed for successful regeneration.*

#### Oak Decline: A North American Problem

*For several decades, a strong decline in oak regeneration has been documented across eastern North America. A variety of interrelated factors may be involved, such as acorn predation by rodents and insects, climatic change, damage to seedlings by insects and deer, and excessive shading by other hardwoods and woody invasive plants. Historically, natural or human-set fires would have periodically removed the competing understory vegetation and allowed young oaks to thrive.*

A number of important studies on High Park were carried out by the Ministry of Natural Resources in the 1980s and by experts hired by the City in the 1990s. These studies revealed much about the ecological significance of the park's natural areas and their need for protection and restoration.

About a third of High Park's terrestrial system is considered to be ecologically significant because of its rare vegetation and plant species. This remarkable diversity is in part due to its location, near the northeastern edge of the Eastern Deciduous or Carolinian forest zone. It contains a large number of plant species with southern or prairie affinities, several species with northern (boreal) affinities, and a few species characteristic of Great Lakes shoreline habitats.

The black oak savannah that dominates the park's sandy uplands is the most significant natural area remaining on the City's Iroquois Sand Plain. Over 10,000 hectares of tallgrass prairies and savannahs were once found in southern Ontario, typically on dry, sandy plains where periodic natural fires kept the forest at bay. Today all too few examples of these savannahs remain and High Park is one of the largest remnants left in Southern Ontario.

The dry, low-nutrient conditions of High Park's black oak savannah supports a wealth of prairie plants that were once found throughout the region but have since become uncommon or rare. These include prairie grasses such as big bluestem, little bluestem and Indian grass, and prairie flowers such as cylindrical blazing star, hairy bush-clover and showy tick-trefoil, plus the wild lupine that blankets the savannah in late spring.



Gera Dillon

Winter scene: a majestic black oak.



High Park contains many other significant plant communities and species. Like the rare and beautiful savannah, the park's dry woodlands are also dominated by black oak, mixed with red and white oak. Sassafras – a tree characteristic of the more southern Carolinian forest zone – thrives on south-facing slopes. In contrast, the cool, moist ravine slopes are covered by mixed and boreal forests of red oak, red maple and eastern hemlock, along with understorey plants associated with more northerly conditions. The wetlands of Grenadier Pond and the Duck Ponds, important remnants of Toronto's once-extensive lakeshore marshes, include extensive patches of the regionally rare sweet flag.

## A Significant Legacy

Because of the park's outstanding natural values, the Province has declared 73 hectares of High Park to be an Area of Natural and Scientific Interest (ANSI). These natural values are a legacy from John and Jemima Howard to the citizens of Toronto, and a legacy that we, in turn, can pass on to future generations.

## High Park's Wildlife

In spite of its location in the heart of Canada's largest city, High Park continues to support a wide variety of wildlife. This diversity is due to the park's large size, location near wildlife corridors, and varied habitats. Although changes to the park's environment have been detrimental to many forms of wildlife, a few species have benefited from these changes.

Coyote, red fox and even white-tailed deer have reached High Park through nearby corridors. Coyotes bred in High Park in the late 1990s before succumbing to disease and other pressures. A native of prairie grasslands, the coyote has greatly expanded its range after the widespread clearing of forests and the elimination of grey wolves in most of North America. It has become well-established in the natural valleylands, ravines and parks of the Greater Toronto Area and may reappear in High Park in the future. Another carnivore that has bred regularly in High Park, the red fox, has also been increasing in Toronto in recent years.

High Park's most familiar form of wildlife, the grey squirrel, was common in deciduous forests at the time of European settlement, and has been at home in our cities and urban parks ever since. More often black in colour than grey in the Toronto region, this species can be found in all areas of the park, from its formal lawns to its forests. The large population of grey squirrels may be contributing to poor oak regeneration, since acorns are a favoured food source, although their storing habits may also play help in the planting process. Eastern chipmunk – a boldly striped small squirrel species that nests in underground dens – is most frequently observed in the oak woodlands. The occasional red squirrel has been observed in forest areas. Woodchuck, or groundhog, is another member of the squirrel family that occurs in the park in small numbers. Southern flying-squirrel, once a regular breeding species, has not been observed in the park since the 1970s.

### An Area of Natural and Scientific Interest

*High Park contains some of the most significant natural areas in the City of Toronto including:*

- *an outstanding concentration of provincially and regionally rare plant species;*
- *provincially rare black oak savannahs;*
- *regionally rare moist red oak and hemlock forests; and*
- *locally significant examples of lakeshore marsh, natural bottomlands and dry red oak/white oak upland forests.*

*MNR, High Park Oak Woodlands of Natural and Scientific Interest (1989)*



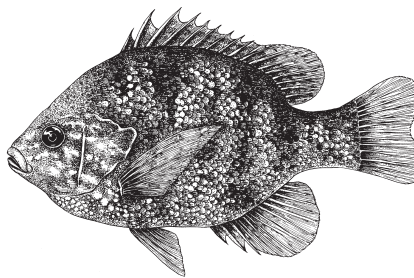
*Cylindric blazing star, a prairie wildflower found in High Park.*





Sam Barone

Young raccoon in early morning light.



Pumpkinseed



Red Admiral Butterfly

Other familiar city-adapted mammals that make their home in High Park are the raccoon and striped skunk. Since both species are largely nocturnal, visitors to the park are more likely to see evidence of their recent presence, such as footprints and grubbed lawns, than the animals themselves. However, raccoons can sometimes be observed during the day sleeping in the upper branches of tall trees.

Big brown bat and little brown bat are common in High Park. Several migratory bat species are likely present in the park on a seasonal basis. Bats roost in tree hollows and under eavestroughs and lampposts during the day. They emerge at dusk and can sometimes be seen swooping after insects near artificial lighting. Cottontail rabbits, opossum, deer mice, meadow voles and Norway rats have been observed in High Park. Other small mammals, such as shrews and moles, may also live in the park.

Muskrat, and occasionally beaver, have been seen in Grenadier Pond and the park's other ponds and wetlands, likely moving in from the nearby Humber marshes. Although both species are active chiefly between dusk and sunrise, they may feed during daylight hours, especially on cloudy days. Muskrats rely heavily on aquatic plants for food, particularly cattails, while beavers also consume woody plant species such as willows, poplars, alder and birch.

There have been unofficial releases of green, leopard and bull frogs into High Park's ponds and wetlands in recent years, but their populations have not persisted. The American toad, a terrestrial species that is more adaptable to urban conditions, breeds in the park's wetlands and has recently become common. The red-backed salamander occurs in wetter woodlands, using nearby ponds for breeding. The park's reptiles include the little brown (Dekay's) snake and garter snake, as well as Midland painted and snapping turtles – all species that are common in urban areas. Map and Blanding's turtle have been seen occasionally. By far, the park's most abundant breeding turtle is the red-eared slider – the common turtle of home aquariums – released into the park's ponds when they are no longer wanted as pets. This non-native invasive species is thriving and displacing the native population of Midland painted turtles.

Poor water quality and loss of habitat have had an impact on fish populations in High Park's ponds and streams. A study undertaken in 1976 indicated that 17 species of fish, including game species such as northern pike, large and smallmouth bass and yellow perch inhabited Grenadier Pond. Studies in the 1990s suggested that the fish community in Grenadier Pond had become unbalanced. Top predators such as largemouth bass and northern pike had declined sharply, while forage species such as pumpkinseeds and bluegills were proliferating. More recent restocking and restoration efforts have resulted in a better representation of top predators, especially largemouth bass.

At least 59 species of butterflies have been found in High Park in recent years, and many of these are known to breed here. At least another 16 species were recorded historically but are no longer present. In addition to a number of showy butterflies such as monarch, red admiral and eastern tiger-swallowtail, the park's breeding species include various small skippers, hairstreaks and "blues" (in the same family as the now-extirpated Karner blue).



Grenadier Pond was once known for its diversity of dragonflies. Although many species have disappeared, the pond and other aquatic habitats in the park still support a variety of these predatory insects. Dragonflies such as green darner, black saddlebags, blue dasher and eastern amberwing patrol the open water during the warmer months. Small, delicate damselflies including marsh, taiga and orange bluet and eastern forktail can be observed just above the water's surface and in the surrounding vegetation.

Over 280 species of birds have been recorded in High Park. The park is an important stop for migratory songbirds, which rest and forage in wooded areas during spring and fall migration. Although many species of breeding birds have disappeared over the last several decades, High Park still provides breeding habitat for species such as red-eyed vireo, indigo bunting and great-crested flycatcher, as well as the regionally rare orchard oriole. Before the shoreline of Grenadier Pond was dramatically altered in the 1950s, species typical of marshes, such as the American bittern, Virginia rail, sora and marsh wren nested in dense aquatic vegetation. The pond remains a good location to view various herons, as well as migratory and breeding waterfowl, including the colourful wood duck.

High Park offers excellent opportunities to view birds of prey (raptors). Red-tailed hawk and Cooper's hawk nest in and around the park. Since 1993 an official hawk watch has been conducted on a small knoll north of the Grenadier Café, known as "Hawk Hill", during fall migration (from September to the end of November). Thousands of migrating hawks, eagles and turkey vultures have been observed flying west along the Lake Ontario shoreline before veering south toward their wintering grounds in the United States, and Central and South America. High daily bird counts often coincide with winds from the northwest, and usually occur after the arrival of a high pressure weather front. The recorded sightings contribute to overall migration records for the Greater Toronto Region and eastern North America.



Mitchell Magditch

*Karner blue butterfly (last recorded in High Park around 1926, extirpated from Ontario around 1991). Studies have been conducted in High Park and other savannah sites in Ontario to examine potential future reintroduction sites for this species.*



Karen Yukich

*A red-tailed hawk perches on a dead snag while searching for prey.*



### Why is Biodiversity Important?

*Biodiversity – short for biological diversity – is a measure of species richness. It is the variety of life, from the genetic level to the whole planet and all its millions of species.*

*Generally, the greater the number of plant and animal species present in an ecosystem, the more resilient it is to external stresses. Biodiversity helps natural communities survive stress, upheavals and catastrophes. Loss of even one species of plant or animal can lead to a chain reaction of events because of species' interdependence. A flower can vanish because the insect that pollinates it has disappeared. An insect population can die out because the plants on which it feeds no longer exist.*

*In terms of biodiversity, every species counts.*

## THE NEED FOR ACTION

Studies carried out in the 1980s and 1990s found that High Park's natural environment had been greatly affected by development both inside and outside the park. The establishment of recreational facilities and planting of turf grass, for example, significantly reduced the size of the black oak savannah. Some past park management practices, such as suppressing fire, planting non-native species and mowing, prevented the natural regeneration of native vegetation. In particular, the lack of natural regeneration of black oaks led to a "geriatric" forest consisting of many trees approaching 200 years old, with few trees in younger age categories.

Over the last two centuries, the park had lost many species of native plants, while the populations of those that persisted had declined dramatically. For example, by the early 1990s only a few specimens remained of the once abundant wild lupines. Invasive plant species took advantage of disturbances to the park's environment by aggressively colonizing many of the park's natural areas, which in turn threatened the survival of the remaining native plants. Disturbances and the decline in plant biodiversity led to a decrease in wildlife.

The park's aquatic communities had also undergone dramatic changes. The construction of the rail and road corridor to the south in 1853 cut the park off from Lake Ontario and disturbed the natural linkages between its ponds, marshes and creeks and the lake. Great expanses of wetlands were lost through road development, shoreline alteration and silt from stormwater runoff. By the 1990s, the park's ponds and creeks were polluted by this runoff, along with industrial spills and contaminated sediments. Concrete edges that replaced long stretches of natural shoreline and stream banks caused a loss of aquatic habitat and disrupted seasonal fluctuations of water levels.

These studies sparked a number of changes in park management. The first steps were to reduce the amount of grass mowing and stop using pesticides for general turf management. The City gave protection to the west shore of Grenadier Pond and began monitoring the conditions of the park's ponds and streams. More studies were undertaken to determine how best to restore the park's terrestrial and aquatic systems. Forest management demonstration plots were established to assess the effectiveness of different techniques such as hand-pulling of invasive plant species and prescribed burns.

These studies and growing public awareness led to a broad consensus that High Park's significant natural features were endangered and needed to be restored. It also became clear that human intervention would be needed because these ecosystems cannot restore themselves. To formalize the remediation strategies that were already underway and guide the long-term restoration of the park's natural areas, the City's Urban Forestry section produced a High Park Woodland & Savannah Management Plan in 2002.

## RESTORING THE PARK'S TERRESTRIAL SYSTEMS

The City's strategy to restore High Park's terrestrial systems, as set out in the High Park Woodland & Savannah Management Plan, has been developed with the involvement of scientists, consultants, community members and interested individuals. It is based on formal studies and field testing to determine what management approaches are most effective.

### Using Fire to Re-establish Natural Regeneration

There are many reasons for the low rate of natural regeneration of High Park's black oaks over the last century. Naturally occurring or human-caused fires were routinely suppressed. In places that were mowed in the past, oak seedlings were destroyed before they could get established. After mowing was stopped, oak seedlings have faced competition from aggressive plant species such as bluegrass and fescue. Numerous informal walking trails and trampling have led to disturbance and compaction of the soil. The park's many squirrels may have contributed to the failure of natural regeneration because they forage heavily on acorns. Acorn weevils and other insects lay their eggs in acorns, rendering them infertile.

The best tool to promote black oak regeneration is the controlled re-introduction of fire into the landscape. Planned and controlled ("prescribed") burns affect grasses and herbaceous plants but do not harm mature fire-adapted trees such as black oaks. This method is currently being used to regenerate savannahs in the Rice Lake Plains, Windsor's Ojibway Prairie Complex, Pinery Provincial Park and other sites in Ontario. After initial test burns in High Park in 1997 and 1998 yielded positive results, an annual prescribed burn program was established in 2000. Indicators of success include the growth of oak seedlings and rare shrubs such as low-bush blueberries and black huckleberry. In areas that had been formerly dominated by non-native fescue grasses, burning has promoted the growth of native sedges, prairie tallgrasses and herbaceous plants such as wild lupines and sunflowers. Groups of native plants have expanded and produced abundant seed crops. Some invasive plants have been reduced in size and some have even been eradicated.

Fire has many beneficial effects. It releases seeds that are stored in the soil, encourages the sprouting or suckering of established plants, and burns off dead vegetation from the previous year, thereby allowing acorns and other seeds to come in contact with the earth, and seedlings to receive more sun. The conversion of leaf litter to ash releases nutrients (calcium, magnesium, potassium and phosphorus), making them available as fertilizer to boost plant growth. The blackened soil warms quickly in the sun, speeding the germination of seeds stored in the soil. Prescribed burning helps to control some species of invasive plants that are not fire-dependent. Over time, the use of fire management increases the diversity and richness of native plant communities, improving habitat for associated insects and other wildlife.

### Principles to Guide Restoration

#### *Aim for Sustainability:*

*Restore the natural communities of High Park to a healthy and self-sustaining state. We must aim for terrestrial and aquatic systems that are natural, functioning, self-regulating and integrated with their surroundings.*

*Mimic Nature: Use historical and ecological evidence to guide restoration. Soils, topography and microclimate should dictate what a vegetation community should be. As far as possible, use local seed and plant sources.*

*Use Appropriate Management Tools: High Park's natural systems are complex and varied, and there is no single right way to tackle its problems, no "magic bullet". We need to use a mix of management tools and select the best tool for the job and the site.*

*Use an Adaptive Management Approach: We need to learn as we go, apply what we learn, and adjust our methods and perhaps our expectations as we monitor progress.*

*Balance Recreational Uses and Environmental Stewardship: People use High Park in many different ways. We must ensure that facilities, infrastructure and activities are compatible with the preservation of the park's natural environment and character.*





*Indian grass, a fire-dependent plant of tallgrass prairies, found in the oak savannah.*



*Before restoration: a dense understory of invasive buckthorn.*



*After restoration: open clearings in which young oaks can grow.*



*Donna Barnett*

*Fred Bruin, Fire Boss (centre), directs prescribed burn operations.*

High Park's dry oak woodlands and savannah and its mesic (moderately moist) woodlands can all benefit from fire management, although the optimal frequency of burning varies. The burn schedule targets high priority areas first: plant communities historically maintained by fire, and those which have built up a seed bank through restoration activities. In dry areas consisting of black oak savannah, the management plan calls for burns to be conducted for two or three consecutive years over a 10-year cycle. Once savannah plants have become re-established on a site and invasive plants have been controlled, the frequency of fires may be reduced to enable young black oaks to grow. In mesic areas with a significant component of savannah plants, burning might take place only once every 15 to 20 years. Prescribed burns would not be done in mesic areas that support stable forests of hemlock, witch-hazel and alternate-leaved or round-leaved dogwood.

## Planting Native Vegetation

Since European settlement, the park's terrestrial ecosystems have been modified so much that they may never support the full range of vegetation that once occurred here. Given the park's isolation from similar vegetation communities – in effect, it is an island of nature in the midst of an urban landscape – the potential for natural regeneration from adjacent habitat is limited. However, by planting and seeding native plants, it is possible to reintroduce some species historically found in the park and to boost the populations of existing remnant species.

High Park's planting program depends on staff and volunteers who collect seeds from native plants such as big bluestem, woodland sunflower, cylindrical blazing star, Pennsylvania sedge and New Jersey tea. Seeds are propagated in the park's greenhouses and later planted in appropriate areas. Plantings focus on increasing the size of existing natural areas, improving connections between habitat fragments, establishing new natural areas, and regenerating closed trails. Native species are also planted in areas that have been cleared of non-native invasive species and in savannah areas that had previously been converted to non-native turf grass. Plant selection is based on historical inventories. Where possible, seeds are obtained locally from natural stands. The first choice for seeds is from the park itself; the second choice is seeds from areas close to High Park that have similar climatic and environment influences. Plantings are designed to mimic the vegetation patterns found in nature: for example, planting in scattered groups, interspersing clumps of

grasses with flowers and shrubs, and combining species that naturally occur together. Care is taken to ensure that woodland species are planted where they would normally be found in nature, considering factors such as light and soil conditions and location on uplands or ravine slopes. Prescribed burns help ensure that the appropriate species mix prevails over time.

## Controlling the Spread of Invasive Plant Species

Invasive plants are plant species that aggressively colonize natural areas. Most are alien species introduced into North America for agricultural, medicinal, horticultural, or erosion control purposes, although some are opportunistic native species. Invasive plants tend to reproduce rapidly and widely, taking advantage of disturbed conditions such as path edges. They have few natural enemies. High Park is especially vulnerable to plant invasions because it is located in a highly urbanized landscape and its natural areas are fragmented by roads, trails and facilities. The park's open woodlands are very susceptible to invasion by dog-strangling vine and woody species such as European buckthorn and exotic honeysuckle. Ravine areas have been invaded by Himalayan balsam, Japanese knotweed, Manitoba maple and garlic mustard. Some of its wetlands have been overrun by colonies of tall Phragmites reeds.

Many strategies are being used to control invasive plant species in the park. Efforts are being made to minimize the kind of disturbances (such as the creation of new paths) that fragment plant communities and create "edge" habitats. Planting native species around the edges of natural areas helps lessen the spread of invasive plants. Avoiding the use of soil from outside the park reduces the chances of importing seeds of invasive species. Restoration staff regularly monitor the prevalence of invasive plant species and evaluate the success of management strategies.

The selection of management tools to control the spread of invasive plants is particular to each species. Knowing how and when plants germinate and disperse seeds, for example, is an important factor in deciding how and when to take action. Mechanical methods of control, including cutting, mowing, girdling or hand-pulling, are successful against some species. Biological controls – using insects that are natural predators – are useful with species such as purple loosestrife. However, only a few invasive species have known safe biological controls, and mechanical methods have limitations – for example, woody species such as European buckthorn tend to re-sprout after cutting, and dog-strangling vine can actually multiply from broken root ends after the plant is pulled. For these and certain other shrubs and plants, the only practical option is chemical treatment, which involves painting foliage or stumps with herbicide. In keeping with the City's commitment to reduce the use of pesticides and the terms of its pesticide by-law, herbicide is used as the option of last resort and is applied selectively and with great care.



*Dog-strangling Vine*  
Of all the invasive plant species, dog-strangling vine poses the most serious threat to High Park's natural environment. Left unchecked it out-competes native plants to form a dense monoculture. It has no known predators and resists mechanical controls. Keeping this invader under control with the help of carefully applied herbicide is a major focus of the restoration effort.



*City staff carefully apply herbicide to control invasive plants.*





Scott Jarvie

Purple loosestrife.

### Meet the Beetles

*Purple loosestrife is a hardy, beautiful and unwanted introduction from Europe. Because it has few natural enemies and is capable of prolific growth, the plant has demonstrated a worrisome ability to invade and colonize wetlands and streambanks, forcing out native plants. Cutting and hand-pulling is not effective in controlling this species.*

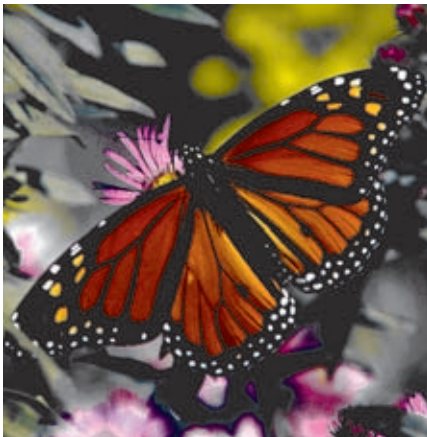
*Since 1998, The Toronto and Region Conservation Authority has been conducting a purple loosestrife biocontrol program in Grenadier Pond. Based on research conducted at the University of Guelph, the program uses two non-native leaf-eating beetles that feed on this invasive plant. The results of monitoring suggest that the beetles have spread around the pond and are significantly reducing purple loosestrife. Continued monitoring will measure long-term effectiveness and any impacts on native plants.*

In a small number of cases, control of invasive vegetation requires the removal of mature non-native trees, such as Norway and Manitoba maples. These trees produce dense shade which prevents the growth of a healthy understorey, contributing to slope erosion. They also produce an abundance of seedlings that out-compete native species. Removal of undesirable mature trees is carried out selectively and gradually, and the trees are replaced with native species that are appropriate for the site.

### Improving Habitat for Terrestrial Wildlife

Wildlife diversity is determined to a large degree by the availability of suitable habitat. Although many species are habitat generalists, relationships between wildlife and vegetation can be very complex. Many flowers rely on insects for pollination, and the insects in turn need to find nectar sources at a specific time during the adult phase of their life cycle. Some species, such as the Karner blue butterfly, have become so specialized in their needs that their existence depends on the continued survival of a single larval food plant (in this case, the wild lupine). Similarly, plant communities evolve in response to wildlife, and the survival of some plant species depends on the presence of certain insects or other animals.

The restoration of High Park's natural areas is helping to restore these plant/wildlife relationships. While High Park's relative isolation, modest size and urbanized location impede the return of many species of wildlife, some species that are more mobile may be able to take advantage of the improved habitat. It is likely that wide-ranging butterflies, bees and other insects can benefit the most from restoration. Habitat for some species of birds can also be enhanced. For example, prescribed burns improve breeding conditions for the regionally rare orchard oriole, a species of open parklands. Plantings of trees and shrubs creates more continuous habitat and increases food and cover for migratory songbirds. As restored areas mature, it may be possible to actively reintroduce insect and other wildlife species from similar sites in southern Ontario.



Sam Barone

Monarch butterflies feed on asters and goldenrods.

The negative impact of prescribed burning on wildlife is minimal, since most animals can easily escape a low ground fire. Care is taken to rotate burn areas and leave some patches unburned so that insect eggs and larvae may survive to repopulate the surrounding area. Some species ultimately benefit from the use of fire as a management tool, since it enhances their habitat.

A variety of other management techniques are being used to improve wildlife habitat. Where possible, large dead or dying snags or “cavity” trees are left in place to provide a vital source of food, nesting sites and shelter for birds and mammals. Cavity-using species in the park include owls, kestrels, woodpeckers, nuthatches, chickadees, squirrels and bats. Large snags are also used by raptors as perches while searching for prey. Where practical, downed logs and other decaying wood and debris are left on the ground to provide food and cover for amphibians, snakes, and invertebrates. Decaying logs also replenish nutrients in the forest floor and provide habitat for fungi, lichens and mosses, as well as nursery sites for trees such as hemlock and yellow birch.

## Minimizing Damage to the Environment from Trails

The park's network of trails allows people to access different areas of the park comfortably and safely. However, over the years many small footpaths and redundant trails have developed and existing trails have widened. These trends are compounded by an overall increase in trail use and high impact activities such as mountain-biking and off-trail dog traffic. The proliferation and spread of trails leads to further fragmentation of natural areas, trampling of native vegetation and increased opportunities for invasive plant species, as well as soil compaction and erosion. Also, the park's habitat potential is diminished when people and pets get closer to bird nests, animal dens and foraging areas.

To address these concerns, the City plans to re-establish a designated nature trail system that can sustain appropriate uses with minimal disturbance to the natural environment. A well-designed trail system avoids sensitive terrain such as erodable slopes, wetlands and areas where rare plant species are found. If surfacing materials are used, they should not spread onto adjacent vegetation. Interpretive signage can play an important role in encouraging park users to stay on the trails and be respectful of the natural environment. Natural obstacles such as shrubs or fallen trees can also help keep traffic on the trail.



### Habitat Restoration Progress 2000–2007:

- 37 ha of oak savannah and woodland areas burned through minimum one cycle
- 30,000 native plants reintroduced to park through combination of staff and community plantings
- 25 ha of oak regeneration areas
- 40 ha of land cleared from invasive plant infestations
- 15 ha of shoreline naturalized on Spring Creek, Grenadier Pond and other stormwater ponds

*This post-burn scene reveals the multiplicity of trails that crisscross the park's natural areas.*

Terry Fahey



### Ancient River

*During the Howard/Ridout Pond expansion, a drilling rig was used to cap two old artesian wells. Authorities took the opportunity to drill a monitoring well to study groundwater. They had gone down about 40 metres when a mixture of shale, gravel, sand and water exploded 15 metres up into the air. The drill had tapped into an ancient underground river! Called the Laurentian River, it is an artesian aquifer thought to be flowing very slowly from Georgian Bay through a layer of sand and gravel just above bedrock level, with some obstruction blocking its smooth exit to Lake Ontario. While the well has been sealed, the river's clean water, tinged red with iron, continues to pour from a overflow pipe into the north end of Spring Creek.*

## RESTORING THE PARK'S AQUATIC SYSTEMS

The City's strategy to improve the health of High Park's aquatic system is aimed at restoring water quality, increasing biodiversity and improving wildlife habitat. Work on many of the components of this strategy has been underway since 1994 with partners such as the Toronto and Region Conservation Authority and Environment Canada.

### Reducing the Impacts of Stormwater

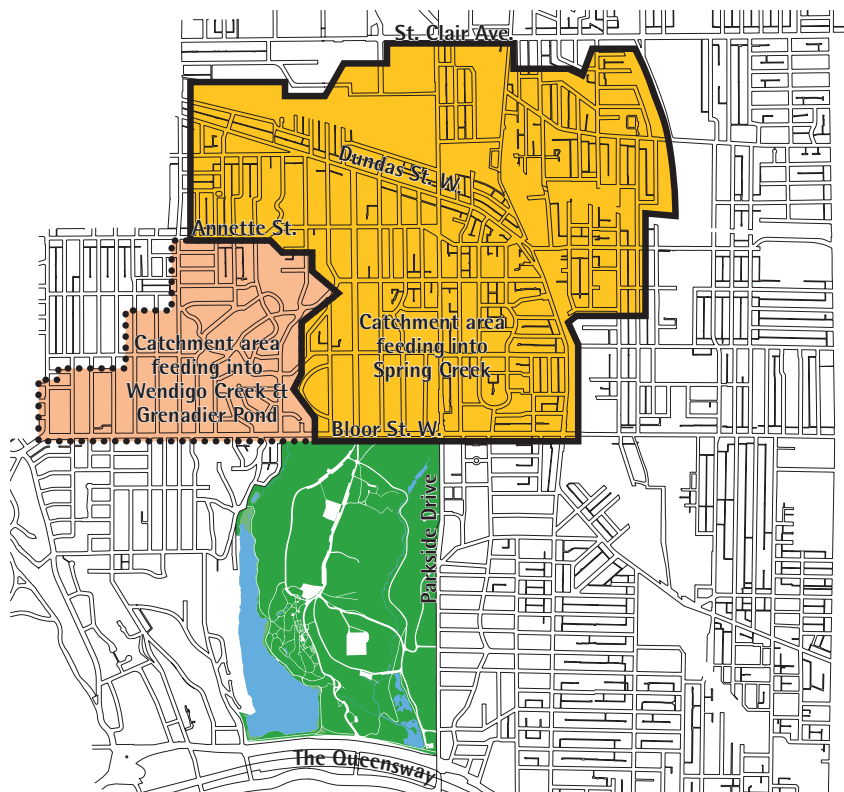
Development around High Park has greatly altered its hydrologic cycle (how water flows). Where once a network of streams drained into a lakefront marsh, a system of pipes now collects stormwater and transports it into modified creeks and landlocked ponds. The catchment area for Grenadier Pond is now about half its original size. Today the pond receives less water from clean groundwater than it did historically, and more from stormwater (or overland runoff).

Most of the rainwater that falls on the roads, roofs and parking lots south of Annette Street flows through storm sewers into Grenadier Pond, West Pond (Catfish Pond) or Spring Creek. A study done for the City in 1995 found that the inrush of stormwater after a rainfall was causing rapid fluctuations in water levels and scouring of streambanks. The contaminants in the stormwater were found to be the major cause of poor water quality in the park's creeks and ponds. As it travels over land, roads and parking lots, stormwater picks up pollutants (sediments, nutrients, heavy metals, oils, animal faeces and bacteria) and deposits them in the park's waterbodies. Eventually, these pollutants settle out into bottom sediments.

To improve stormwater management for Grenadier Pond, the City renovated and expanded Wendigo Pond in 1999. This sedimentation pond is fed by Wendigo Creek and empties into the north end of Grenadier Pond. Its edges were bioengineered with plants to provide a natural edge and be visually attractive. This pond retains stormwater during rainstorms, allowing the sediments and contaminants to settle out. The result is that the water that goes into Grenadier Pond is cleaner, and is released at a controlled rate that reduces fluctuations of water levels.

In 1998, the City began a Class Environmental Assessment on Spring Creek and the Lower Duck Pond. This study showed that the water in the system had high levels of phosphorus, bacteria and heavy metals such as boron, aluminum and copper. It concluded that the best way to improve water quality in Spring Creek would be to expand the two sedimentation ponds, Howard and Ridout Ponds, at the north end of the creek. In 2003 the ponds were expanded and deepened to increase the volume of stormwater they could retain and allow more time for pollutants and sediment to settle out of the water column.

While it is normal for creeks to gradually change their course, the scouring effect of stormwater running off the hard-surface developed areas north of High Park has led to serious erosion along Spring Creek, threatening the stability of the adjacent slopes. Restoration of the upper section of the creek started in 2007. The project will rebuild and reinforce the eroded banks, allow passageways for fish to move upstream through a series of small weirs, and combine shallow rapids with small pools for spawning. The long-term plan is to continue to allow the creek to meander as naturally as possible, with minimal adjustments where needed to guide its path.



High Park's stormwater catchment areas.

## Naturalizing Shorelines

Over the last century, much of the park's natural shorelines have been altered by filling, hardening and replacement of native vegetation with turf grass. About 45% of the natural shoreline edge in Grenadier Pond, for example, was replaced by a concrete curb and manicured turf grass in the 1950s. In these areas, shoreline vegetation and wetlands were lost, as was the gradually sloping "littoral" zone, the most productive part of an aquatic ecosystem.

Naturalization of Grenadier Pond's hardened shorelines began in 1995, focussing initially on the east and southwest shorelines. Sections of the concrete curbs were removed, and fill was placed to recreate a more natural underwater profile. With the assistance of hundreds of volunteers from local schools, scout groups and the High Park Volunteer Stewardship Program, the softened shoreline was then planted with a wide variety





Concrete curb along Grenadier Pond shoreline.



Shoreline after naturalization.

of bulrushes, sedges and wildflowers. In 2005 another naturalization project extended the softened edge across the entire south shore of the pond.

Many of the naturalized portions of Grenadier Pond's shoreline are now well established. The naturalization program has enhanced biodiversity along the shoreline, created spawning habitat for pike, bass and other fish, and vegetation cover for juvenile fish.

### Creating Additional Wetlands

We know from historical photos and maps that Grenadier Pond once supported extensive wetlands. Much of this habitat was lost because of shoreline alteration and the impacts of stormwater. The entire north arm of Grenadier Pond was once a marsh; in 1995, little of that remained due to sedimentation. The large marsh that once rimmed the southern end of the pond was entirely destroyed when it was filled in to build the Queensway roadway in the late 1950s.

In 1997, the wetland at the northern end of Grenadier Pond was expanded and rehabilitated to improve its functioning, increase the diversity of plant species, and improve wildlife habitat. In 2000, a different kind of wetland was built in the Lower Duck Pond. Its major function is to clean stormwater entering from Spring Creek. Separated from the rest of the Lower Duck Pond by a berm, the wetland contains cattails and other aquatic plants that help

remove pollutants from water while providing habitat for wildlife. Based on this model and other studies, a number of stormwater management facilities were constructed in the High Park/Ellis Avenue area in 2006 as part of the City's Wet Weather Flow Master Plan. One of these facilities, located on the west shore of Grenadier Pond just north of the southwest cove, combines a sedimentation forebay with a wet pond/wetland area. The stormwater treated in this facility is expected to be cleansed of up to 80% of its suspended solids and associated heavy metals and bacteria before entering the pond.

In its natural state, the water level of Grenadier Pond was greatly influenced by its direct connection to Lake Ontario, which typically fluctuates a metre or more over the course of a year. Today, water from the pond flows through an outflow weir at the southwest corner of Grenadier Pond into the Humber River and Lake Ontario. To re-establish a more natural water level regime, the outflow weir was modified in 1996 so that the water level can be lowered during the late summer and early fall to stimulate the growth of aquatic plants near the shoreline, and raised in the spring to provide flooded edge habitat for spawning fish.

### Reducing Nutrient Loadings from Canada Geese

A 1995 study of Grenadier Pond discovered that about 40% of the phosphorus entering the pond each year was coming from stormwater and overland runoff contaminated with Canada goose excrement. High levels of phosphorus were stimulating unwanted algal growth that in turn caused low oxygen levels in the pond during the late summer and early fall.

The City is using a number of approaches to reduce the high nutrient loading caused by waterfowl. Shoreline naturalization projects that replace turf grass with shrubs and high grasses tend to discourage Canada geese from grazing. Pamphlets and signs have been developed to persuade people not to feed waterfowl. Under a permit from the Canadian Wildlife Service, the Toronto and Region Conservation Authority staff put kerosene on goose eggs in the spring to prevent them from hatching. Because of these actions and improvements in stormwater management, nutrient loadings are improving significantly in Grenadier Pond.



Canada Geese

Gera Dillon



## Re-establishing a Healthy Fish Community

The study done for the City on Grenadier Pond in 1995 found that its fish community was unstable because of poor water quality and limited habitat. Despite stocking efforts, only a few top predators (largemouth bass and northern pike) were found. Without enough top predators to limit them, populations of small fish such as golden shiner and sunfish had dramatically increased.

Since that time, water clarity has improved because of better stormwater management and predator populations have become more balanced. The amount of spawning habitat and cover for juvenile fish has increased because of the City's efforts to soften shoreline edges and increase aquatic vegetation. In 2007 additional restoration along the east shore of Grenadier Pond improved fish habitat through a series of underwater shoals, log cribs and root wads.



*Largemouth bass spawning shoal in Grenadier Pond.*

## Cleaning Up Contaminated Sediments in Grenadier Pond

The same study also indicated that the bottom sediments in Grenadier Pond had high levels of phosphorus and traces of heavy metals. The phosphorus in the sediments was cycling back into the water column, and accounted for about 32% of the total phosphorus loadings to Grenadier Pond.

Detailed studies were then done to identify sediment hotspots: the areas of poorest sediment quality. Options for dealing with the sediments were analyzed by sediment remediation experts at Environment Canada. The options – all extremely expensive – include dredging, treatment with chemicals and artificial aeration. The question of how to deal with bottom sediments remains to be answered. It is likely that the sediment problem will slowly improve as other stormwater management, shoreline naturalization and wetland creation projects are completed. The sediments being laid down today, for example, will be much cleaner than those deposited in the 1970s. Today's cleaner sediments will eventually cover the old contaminated deposits, isolating them from the water column and aquatic organisms.

## COMMUNITY INVOLVEMENT

Community involvement, both formal and informal, is integral to the protection and management of High Park. Volunteer support greatly contributes to the success of the ongoing restoration program and the responsible stewardship of this valuable resource.

The City of Toronto created the High Park Citizens' Advisory Committee (HPCAC) in 1995, formalizing an interim group set up two years earlier. In 2003 the HPCAC was renamed the High Park Community Advisory Council and an affiliated non-profit charitable organization, High Park Initiatives (HPI), was established. The HPCAC provides the City of Toronto Parks, Forestry and Recreation Division with an ongoing source of public input and assistance in all matters concerning High Park. Its Natural Environment Committee advises the City on ecologically sound park management, restoration and operations practices. The Built Environment & Safety Committee advises the City on infrastructure maintenance and improvements, including issues around roads, lighting, buildings and other structures, as well as safety concerns. The Program Group Committee supports and facilitates cooperation among various park programs sponsored by the HPCAC, HPI, the City and other groups. The K-9 Committee promotes responsible dog-walking in the park and provides input on matters related to this activity. High Park Initiatives raises funds for various park programs and projects, manages the staff and operation of the High Park Nature Centre, and operates the Friends of High Park membership program.

The Volunteer Stewardship Program (VSP) is one of many initiatives sponsored by HPCAC, HPI and Friends of High Park. Through this program, volunteers take part in weeding, planting, seed collection, native plant sales and other restoration activities. In another program, Park Watch, volunteers act as hosts, provide information and assistance when needed, and identify and report any potential safety problems to the police or park staff. They also promote safe and responsible behaviour among park users. Other volunteer-led activities include walking tours and seasonal children's events.



*Volunteers assist with the restoration of the Grenadier Pond shoreline.*



The High Park Nature Centre offers year-round experiential environmental education programs to children, families, school groups, other organizations and the general public. Its programs help park visitors of all ages gain an appreciation of the park's unique ecosystems and participate directly in the restoration of the park's natural areas.

The City-operated Children's Garden and Exploring Toronto programs provide opportunities for children and youth to learn about, experience and enjoy urban ecology and organic gardening in High Park. The City also maintains a year-round museum in High Park, Colborne Lodge, the 19th century home of High Park's founders, John and Jemima Howard. The Lodge conducts a wide variety of workshops, educational programs and community events for all ages on the lives of the Howards and their legacy of High Park.

All of these groups strive to promote activities that are compatible with the natural environment and character of High Park. In doing so, they help our community connect with one another and with the park that we all treasure.



*Volunteer Stewardship Program volunteers planting a new savannah area.*

Sharon Lovett

## LOOKING FORWARD

Restoring High Park and preserving it for future generations is not a simple matter. It will take time to address the effects of development and practices dating back more than a century, as well as the ongoing impacts of urbanization and diverse human activities. It will require financial resources to develop and implement restoration programs and maintain sustainable management practices. It will take the best ecological information and the best management tools available. It will also depend on community involvement and support, partnerships with agencies and organizations, and responsible stewardship by everyone who uses the park. Success will require the commitment of many hearts and minds and the work of many hands.

It is happening. Through our efforts we can continue to nurture the vision that John and Jemima Howard had in 1873, the vision of a unique and magnificent natural park to be used in perpetuity by the citizens of Toronto.



Gera Dillon



## FOR MORE INFORMATION

Those wishing to learn more about the natural systems of High Park may find the following resources useful, listed here in chronological order. They are available at the High Park Branch of the Toronto Public Library, along with other archival material on High Park.

- Wainio, A., J. Barrie, J. Roswell and K. McIntosh, 1976. *An ecological study of Grenadier Pond and the surrounding areas of High Park – Toronto*. OMNR/General Foods Ltd.
- Zimmerman, A.P., L.A. Warren and S.G. Smith, 1986. *The comparative limnology of Grenadier and Catfish (West) Ponds, High Park, Toronto, Ontario*. University of Toronto, Department of Zoology.
- Varga, S. 1989. *A botanical inventory and evaluation of the High Park oak woodlands Area of Natural and Scientific Interest*. OMNR, Parks and Recreation Section, Central Region.
- City of Toronto, May 1992. *High Park: Draft proposals for restoration and management*.
- City of Toronto, November 1992. *High Park: Proposals for restoration and management and framework for implementation*.
- Applied Ecological Services, September 1993. *Analysis of historic and existing ecological conditions of significant oak woodlands at High Park, Toronto, Canada*.
- Applied Ecological Services, March 1995. *Savannah research plot program at High Park's Oak Woodlands*.
- Gartner Lee Limited, June 1995. *Proposals for the rehabilitation of Grenadier Pond, Wendigo Creek and associated wetlands*. Prepared for the City of Toronto Department of Parks and Recreation.
- ECOFOR Woodland Management Consulting and LGL Ltd., July 12, 1998. *Forest management demonstration areas for High Park*.
- City of Toronto, Urban Forestry Services, Parks and Recreation Division February, 2002. *High Park Woodland & Savannah Management Plan*.
- High Park Initiatives, 2008. *Rare Plants of the Endangered High Park Black Oak Savannah*. A Volunteer Stewardship Program Guidebook.

More information about High Park is available at:

- [www.highpark.org](http://www.highpark.org) (website of the High Park Community Advisory Council, High Park Initiatives and Friends of High Park)
- [www.toronto.ca/trees/ravines.htm](http://www.toronto.ca/trees/ravines.htm) (City of Toronto – Forestry web page)
- [www.toronto.ca/parks/highpark.htm](http://www.toronto.ca/parks/highpark.htm) (City of Toronto – Parks web page)
- [www.toronto.ca/culture/colborne.htm](http://www.toronto.ca/culture/colborne.htm) (City of Toronto Culture – Colborne Lodge programs)
- [www.toronto.ca/parks/programs/children.htm](http://www.toronto.ca/parks/programs/children.htm) (City of Toronto – Parks Children's Garden programs)



Natural Areas  
(Unknown)



Washrooms