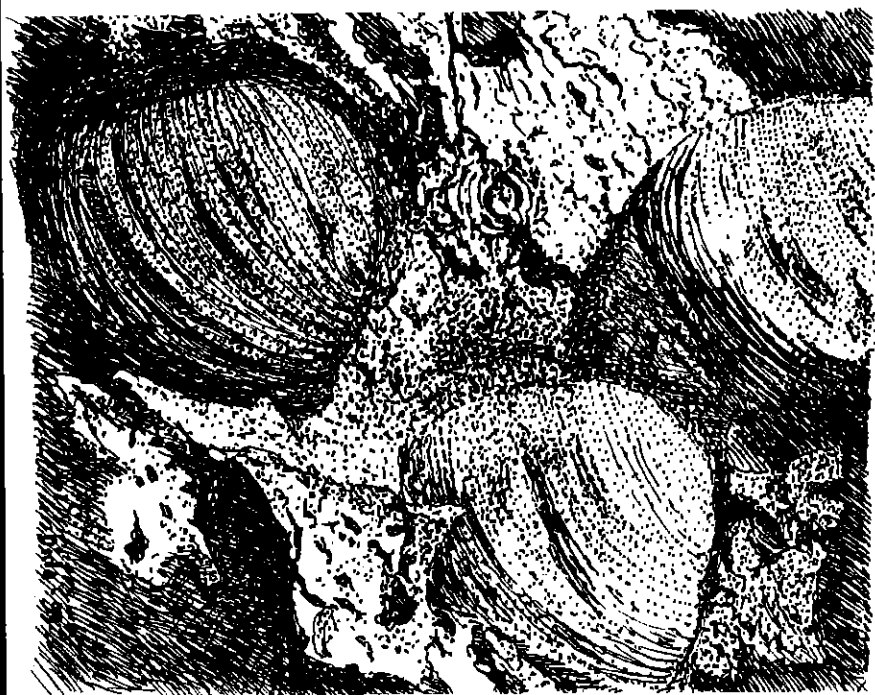


Humber Forks at Thistle town



by Joan O'Donnell



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Cover illustration: fossil of extinct, large (about 10 cm across) clam, from shales of West Humber at Thistletown, drawn by Diana Banville from a Royal Ontario Museum photograph. See page 17-18 for its story.

Humber Forks at Thistleton

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Foreword

Urban natural history is important. Natural areas remaining within urban areas need protection and often restoration. This is a task in which the informed amateur field naturalist can play an important role.

In 1973 the Toronto Field Naturalists published its first ravine survey. A small semi-natural ravine known as Chatsworth Park Ravine was examined by three members who prepared a report in which they described the history, the current human uses and the natural history of the area. They listed the plants and animals present and they made recommendations for the restoration of the valuable natural features of the area. The report was well received by the nearby residents and the City of Toronto Department of Parks and Recreation, which was responsible for the management of the ravine. Since then a number of other studies have been published.

In June of 1976, the Toronto Field Naturalists published "Toronto the Green." Although this report describes Toronto's natural features, the values of natural areas in the urban environment, and makes recommendations about their conservation and management, individual surveys of specific areas continue to be needed in order to provide a record of the plants and animals present, and the condition of the natural features of these areas at a specific time. By comparing these records we can learn how plants and animals adapt (or do not adapt) to the various pressures of urbanization. Once a survey for a particular area has been compiled, the information contained in it can be updated from time to time, and thus the condition of that area can be monitored on a continuing basis.

Members involved in the preparation of surveys become better naturalists as they observe nature in the city, and better citizens as they explore ways to protect and conserve Toronto's valuable natural heritage.



Growing Up by the River – in the 1920s

When we were young, The River was a continual source of interest and recreation. We felt connected, as if it belonged to us. Our house, garden walls and rockeries were built of stone hauled up from the river bed. During summer droughts we carried pails of river water to the parched garden, always hoping to strike a deal – a few cents per pail if we were lucky.

Through all seasons our river intrigued us. In our area the West Branch of the Humber had a unique form – deep pools, separated by shallow, rocky sections, where the water trickled over the stones. The deep pools were wonderful for swimming; perhaps a bit warm on hot days, sometimes muddy after rain, but not polluted. The bottoms of these pools were smooth shale rock, and we could approach the deep area by natural stone steps. Sometimes there were sudden floods in the summer; our peaceful pools would disappear for a few days, and only the very brave and strong would dare to swim.

The shallow rocky areas were treasure troves. We spent many barefoot hours exploring them, turning over rocks looking for interesting life forms. The crayfish would dart away – backwards. There were water boatmen hiding under stones, water striders which could magically walk on water, and so much more. And what a thrill if we found a giant water bug! The areas where the rocks were drier were ideal for nesting sandpipers and killdeer. And, to us, the fluffy, tiny, running young were the cutest little creatures in the world.

Mother was always ready to walk “up the river” with family or friends. We seldom went “down the river” toward the forks where it emptied into the main Humber; this seemed less interesting, and probably involved packing a lunch. Up the river, beyond Concession A (Islington Avenue) was “bluebanks” – a sheer cliff made of layers of shale, and dropping down into a very deep pool. By climbing up above this cliff one could reach Farr’s bush, just before Concession B (Kipling Avenue). This was springtime heaven! All the spring flowers were there in profusion – clumps of furry hepaticas nestled in the dead leaves, delicate spring beauties, hand-staining bloodroot, fascinating squirrel corn and Dutchman’s breeches, stately Jack-in-the-pulpit, and trilliums everywhere. And the trees were full of singing birds.

During summer and fall we would hunt for fossils; and the Humber rocks were lumpy with them, a new “crop” every year. Once somebody found a complete stone fish. The most exciting find was a pile-up of fossilized, overlap-

ping clam-like shells. The museum was contacted. There was great interest and surprise because this particular fossil was new for this geological era. Half of our great discovery is now resting at the Royal Ontario Museum with a brand new name – *Vlasta americanus*. (See cover and pages 17-18).

In winter the deep areas of the river became excellent skating rinks, because the still water froze smoothly. We could skate by moonlight. I can remember a ring of sleds in the centre, for the weary; the happy skaters young and old, and the dogs trying to join in the fun.

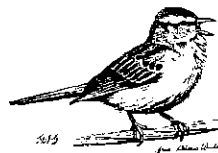
At last came spring and the excitement of the ice break-up. There were some impressive spring floods in those days; we would hurry home from school so that we could watch in awe from the highest riverbank as the thick ice cakes fought their way along in the angry water. We respected the danger in the rushing torrent, and took no chances. But one spring evening a foolish stranger tried to drive through the water which was streaming across Albion Road, and was swept away. Somehow he managed to escape and climb a tree. Such excitement! Rescuers came from town. And there were photographs in the newspapers.

After the water receded it was time for sucker fishing. This was a mysterious occupation which took place after dark. The boys quietly went off in their rubber boots, carrying a light. Perhaps the less said about that the better.

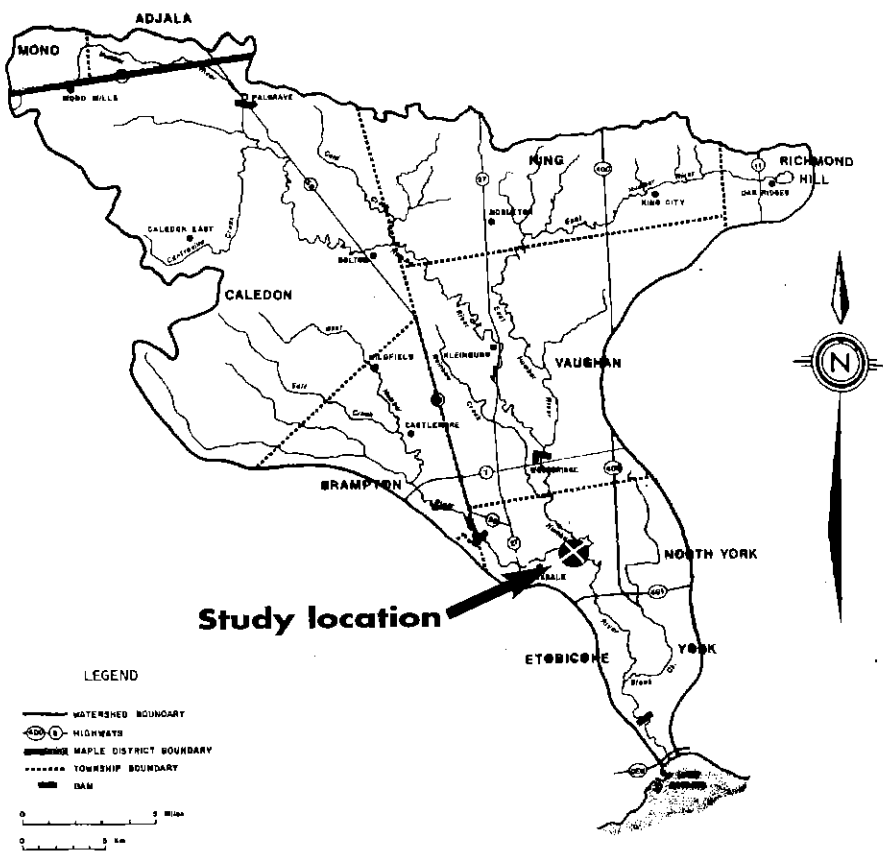
Soon the turtles would appear. Every year the same ancient snapper would be carried home with his jaws locked around a broom handle. He visited briefly, just long enough to frighten the girls. The painted turtles were allowed to walk around the lawn a while before they also were returned to their river habitat. The tin wash tub was filled with river water, ready to receive other creatures for our inspection. Usually a few mudpuppies would spend some hours there; such strange looking salamanders with their flattened faces, and red feathery gills.

In the marshy backwater pools the toads and frogs would be mating and laying their eggs. One would lie in bed, the window open to catch the spring breeze, and listen happily as the trilling of the toads announced that spring had truly arrived; and once again a world of wonder awaited by The River.

Billie Bridgman



Study area location in Humber River watershed



Introduction

The area chosen for this study, where the West Humber River joins the main Humber, consists of the land on which the pioneer Grubb farms were situated in north Etobicoke. As part of one of the largest natural areas in Toronto it supports a wide variety of floral and faunal species. Some parts are heavily used whereas others are seldom visited.

Status

Until January 1, 1998 when Toronto became a megacity, Summerlea Park was owned by the City of Toronto and managed by Etobicoke Parks. It is now managed by Toronto Parks. Ontario Hydro owns the Hydro corridor, while Etobicoke's last working farm on Bankfield Drive is privately owned. The City of Toronto owns the strip of land bordering Islington Avenue north of the river. The City also possesses two long lots stretching from Riverdale Drive, on which the Franklin Carmichael Art Centre and Curtin Park are located, west through the valley to Islington Avenue. The rest of the valley land is owned by the Toronto and Region Conservation Authority (TRCA), formerly the Metropolitan Toronto and Region Conservation Authority (MTRCA) and maintained by Toronto Parks.

Location

The study area is located in the north part of the former City of Etobicoke. It is bounded on the west by Islington Ave., on the east by the main Humber River, and on the north and south by the valley edges and streets.

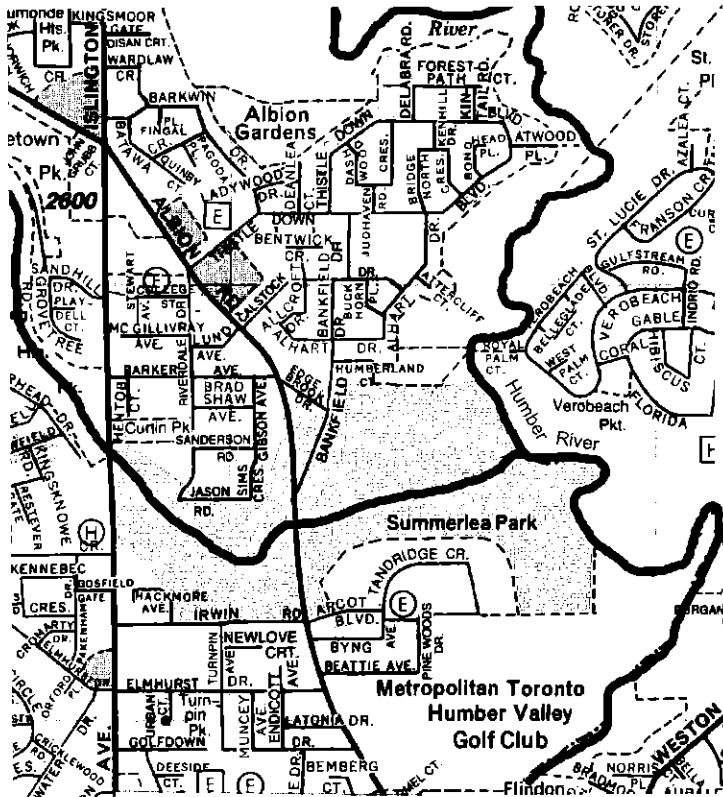
Access

The study area is bisected from east to west by the West Humber River, and from north to south by Albion Road, resulting in four separate sections. The easiest access to all four areas is from Albion Rd.

To enter the Elm Bank area (**northwest section**) step over a metal barrier just north of the Albion Rd. bridge, and follow a narrow path along the base of the hill. Much farther along, this path ends at private property. The only way to continue is to scramble down a three-metre bank, walk a short distance along by the river, and climb up again. Here a track continues to Islington Avenue. To avoid the hill you can follow a track south from Barker Ave., parallel to Islington Ave.

To reach West Humber Park (**southwest section**) start at the parking lot off Albion Rd. just north of Irwin Road and continue along the bike path.

Humber Forks at Thistletown



from Rand McNally Golden Horseshoe Street Finder, 1996.

 Study area

You can also enter this area from Islington Avenue. The hill on the east side is steep and difficult, whereas the path on the west side of Islington leading down from Thistletown Collegiate is more advisable. This is a much easier path, and from there you can walk under the Islington bridge.

Summerlea Park (**southeast section**) may be entered either by using the bicycle trail from Arcot Blvd. or by taking the gravel road just south of the Albion Rd. bridge.

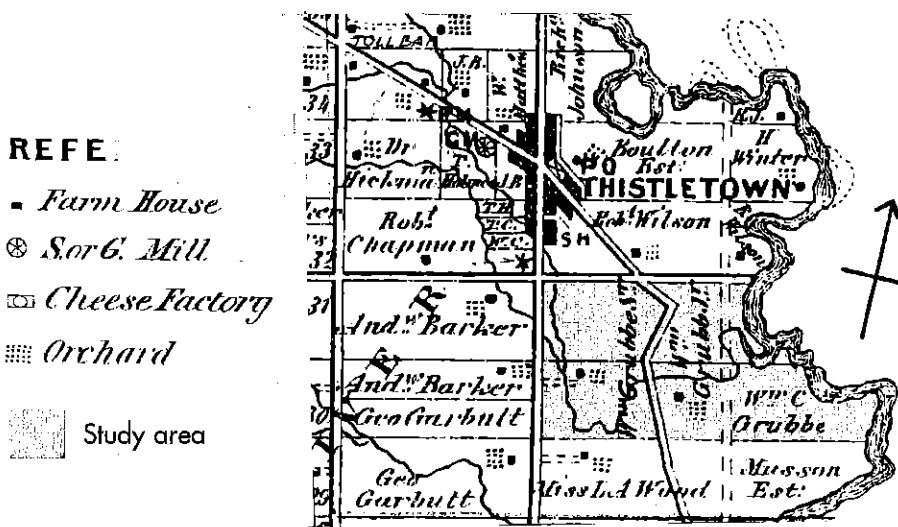
The **northeast section** which includes a former horse farm may be entered by walking through the Pedestrian Access in the fence south of Bankfield Drive, or by following the bike trail from Summerlea Park and crossing the pedestrian bridge east of Albion Rd.

History

A lot of the early history of north Etobicoke happened in the village of Thistletown, which was situated in the area surrounding Albion Road and Islington Avenue. It was named after the local physician, Dr. William Thistle. In the 1830s a builder named John Grubb and his family emigrated from Edinburgh and settled nearby on a 100-acre farm which straddled the West Humber between Islington Ave. and Albion Rd. The remaining two-story ledgestone house at 23 Jason Rd. is now the oldest occupied house on its original site in Etobicoke. He then built a riverstone house beside it, facing the river, and named it Elm Bank (19 Jason Rd.) Across the street the stone house (now 34 Jason) was first used as a piggery, while just east of this the existing large two-story dwelling (at 32 Jason) was built on the original stone and mortar barn foundation. Later, he also purchased the 100-acre farm east of Albion Road with its riverstone house which was named Brae Burn. In the 1950s it was moved to Black Creek Pioneer Village on Jane Street, and replaced by townhouses. This study area was formerly these two Grubb pioneer farms.

Beginning in 1841 John Grubb directed the construction of the plank road (now Albion Rd.) from Weston Rd. to Thistletown and on to Bolton. A sawmill, on a property owned by Thomas Musson of Weston adjoining the

1878 map of study area showing Grubb Farm (formerly Grubbe)



from the *Illustrated Historical Atlas of the County of York, etc.*, published by Miles & Co., Toronto, 1878

Brae Burn farm, cut white pines to provide the planks for the road. The mill-race can still be traced on the present Humber Valley Golf Course, and a grove of the original white pines remains near the clubhouse.

During the devastation of Hurricane Hazel in 1954 more than eight inches of rain fell in eighteen hours, and caused Ontario's worst flood in recorded history. Along the West Humber at Albion Road four young men were swept away. Two drowned, but the other two were guided to shore by the shouts of volunteer firemen. Summer cottages near the river were demolished, and the Albion Road and Islington Avenue bridges were badly damaged and impassable. Both were later replaced. Village residents were without electricity, and water was flown in by helicopter.

As a result of the destruction the Metropolitan Toronto and Region Conservation Authority (MTRCA) was established, and it acquired the valley lands in order to prevent a reoccurrence of this human tragedy. Many sections of the river were straightened, including the area midway between Albion and Islington, and huge bulldozers were used to push up a barrier of soil along the south bank which allowed the water to flow more quickly, and end the annual flooding of Albion Road. Until Hazel most of the valley had been pastured to the river banks, but now many plants, shrubs, and trees began to regenerate. In 1964 Claireville Dam was built upstream to regulate the flow of the West Humber.

Luke Irwin a local resident reported that bluebirds nested here in the 1920s, and Richard Saunders, naturalist and writer, recorded a sighting of two snowy owls in the fields at Thistleton in the fall of 1945. A pheasant farm near the village was demolished during Hazel, and many of the birds escaped. As a result, pheasants were common in the area up to the early 1990s. There had also been a mink ranch on Riverdale Avenue. The presence of so many apple trees in the valley and on residential property dates back to earlier farm orchards.

More recently Dr. Curtin, a local doctor, enlisted local boys to plant numerous conifers along village streets. In the 1970s she willed her log home and property at 34 Riverdale Avenue to Etobicoke, and it is now the Franklin Carmichael Art Centre. Parks and Recreation maintains the lovely garden, and removes fallen and decaying wood. Until the early 1980s there was a horse farm with woodland riding trails in the northeast section bordering Albion Rd. MTRCA eventually purchased this property.

Geology

Beginning at Thistletown, the West Humber River cuts into Toronto's bedrock, exposing layers of shale containing a great variety of fossils, dating from about 450 million years ago at a time when this region was under a shallow subtropical sea.

Topography

The elevation at Thistletown is reputed to be the highest in Toronto. The valley walls on both sides of the river near Islington are extremely steep, as is the hill on Riverdale Avenue south of Sanderson Rd. Historically there were a lot of springs in the village and there is still a secluded spring-fed pond in the study area.

The West Humber pedestrian/bicycle route traverses the area from Islington Ave. to east of Albion Rd. where it crosses the river on a wooden bridge and continues along the Horse Farm section. The utilities corridor enters West Humber Park at Irwin Road, and also goes across the West Humber to the Horse Farm immediately east of Albion Rd. A high pressure oil pipeline, a gas line, a trunk water main, and a sanitary trunk sewer all follow the Hydro right-of-way.

The Summerlea Park facilities include two bocce courts, a softball diamond, a cricket pitch, and six soccer fields. The area boasts three children's playgrounds as well as a wading pool. Near the ice rink/tennis courts there is a small parking lot, and another one at the end of the gravel road. The washrooms are only unlocked during organized soccer games. At present there are a few picnic tables near the baseball diamond and the soccer fields, and a few more near the parking lot for West Humber Park.

Soils

Elm Bank is located on Peel clay so there is little erosion except on steep slopes. The trees usually associated with this type of soil are Manitoba maple and American elm, which is certainly true of this area. Across the river the West Humber Park is situated on Cashel clay, which is well drained. Most of the area east of Albion Road consists of Fox sandy loam where the topography slopes gradually and the drainage is good. This soil tends to erode easily, and in several areas the river bank has deteriorated. It is interesting that a number of Carolinian plants, which thrive on sandy soil, are found here.

The Watercourse

The West Humber is generally fairly shallow, but 100 metres west of Albion Rd. there is a hole 1.3 metres deep where large dogs plunge in for a swim and kingfishers dive for fish. The river flows through an area of heavy clay and sparse woodlands, so water goes into the stream rather than percolating into the ground. This, combined with a steep gradient, makes the river prone to flooding. After a thaw or prolonged rain the river is twice as wide as usual with deep surging waves. Rip rap on both banks east of Islington protects against erosion during these conditions. When the river returns to normal after a couple of days, streamside vegetation is often festooned with discarded plastic garbage. Two large trees have fallen into the river and now collect unsightly debris which creates a backwater. During summer droughts the river becomes shallow and it is possible to walk across on flat stones in several places. The Peel plain is mainly agricultural and the rocks become coated with algae feeding upon the excess nutrients from farm fertilizer washed into the river upstream.

The main Humber is much deeper and heavily laden with silt after a rainfall, and the contrast with the West Humber is often visible at the forks. There are several deep holes along this section of the main river where rock bass and carp often congregate. Occasionally in winter the river is choked with ice pans, some of which are pushed well up onto the bank where they scour bark from tree trunks. Bacteria testing published in 1986 indicated that fecal coliform in the West Humber at the confluence with the main Humber exceeded the maximum objectives during wet weather.

Habitats

Elm Bank

Elm Bank is the most heavily wooded of the four sections. It was aptly named and a number of American elms still survive as well as more recently planted Siberian elms. Immediately north of the entrance to the trail at Albion Rd. the churchyard has recently been planted with native species such as red osier dogwood as well as introduced meadow species. The extension of Riverdale Ave., which passed through Elm Bank until it was washed out by Hazel, has dwindled to a narrow path through the woods as natural succession occurred. Near the site of the former bridge, staghorn sumac is proliferating. Hop hornbeams are numerous on the slope as well as a few walnuts and butternuts. Beside the path an enormous cottonwood, still erect though dead, measures 1.17 metres in diameter at breast height. A short distance farther on is a grove of balsam poplars.

Crack willows and Manitoba maples are typical of the bottomland, while Morrow's and Tartarian honeysuckles, red osier dogwood, buckthorn, pin cherry, apple, hawthorn and black raspberries are widespread in the understory. The vines of riverbank grape and Virginia creeper drape many trees and shrubs. Two unwanted immigrants, garlic mustard and pale swallowwort, form an ubiquitous groundcover. Migrating and nesting birds are drawn to the area by the presence of the many trees, fruits, nuts and seeds. A heavy storm in December 1992 coated tree limbs and trunks with a thick layer of ice and snow which damaged or felled many Manitoba maples and other trees on the valley floor. The large quantity of dead wood in this part of the valley provides excellent habitat for woodpeckers. Sometimes hawks and the occasional great horned owl perch on the row of decaying poplars planted early in the century.

The slopes near Islington are covered with a forest of sugar maple, beech, hemlock, and American elm, with a few white pines towering above the rest of the canopy and a small number of red oaks on the bank facing the river. Old pileated woodpecker workings and a nest hole can be seen on a snag beside the steep trail below the Franklin Carmichael Art Centre. This elevated area is a favourite haunt for red-tailed hawks. Once grey squirrels were observed here at dusk scrambling after falling beech nuts.

West Humber Park

Since the extensive meadow in West Humber Park near Albion Rd. has been allowed to naturalize, spreading dogbane has appeared, a plant that had not been found previously in the study area. In winter, meadow voles live in their tunnels under the snow where they are often preyed on by foxes.

Between the bike trail and the earth barrier along the river bank is a long, narrow, permanent pond that was formerly an oxbow bend in the river. The sure-footed can negotiate the path along the top of the barrier while others can approach from the south side. A small cattail marsh contains arrowhead and water plantain, and scouring rush grows nearby. Dragonflies and damselflies dart about as water striders and whirligig beetles appear to skate on the surface and water boatmen row along. For several years brook silver-sides were observed, sometimes skipping above the surface, while yet another year creek chub took their place. How the fish get into this isolated pond had been somewhat of a mystery. However one year ice floes were seen lying near the top of the barrier, so a plausible explanation might be that during severe spring flooding, water containing the fish or their eggs overflows the banks and enters the pond. Green frogs and American toads abound, and painted turtles bask in the sun. An enormous snapping turtle has been seen a number of years, laying her eggs on the mound. Sometimes they fall prey to inquisitive minks. Occasionally mallards, belted kingfishers,

great blue herons, green herons and black-crowned night herons visit the pond to dine, and cedar waxwings often hawk for insects above the water.

Some garden shrubs and plants found here date back to the former cottages. One area has become overgrown with scores of lilacs whose blooms are showy in May. The slopes near Islington support a stand of sugar maples, several beech trees and some basswood. Much of the hillside is covered with vegetation, but nothing grows on the steepest inclines.

Summerlea Park

In the Summerlea Park area at the river bend east of Albion Rd., bank swallows nest in the sandy bank. They often fly low over the soccer field where Canada geese, ring-billed gulls, killdeer and northern flickers feed in the grass. On one occasion a wood duck was observed swimming among the inundated crack willows and Manitoba maples in the bottomland during an early spring flood. At the river edge blue vervain, boneset, pale smartweed and cut-leaved water-horehound can be found. A path through a naturalized area leads north from the soccer field along the West Humber to its confluence with the main branch. It is necessary to detour through some trees to avoid undercut and eroded banks. This path becomes completely overgrown in the summer. Belted kingfishers and black-crowned night herons frequent this spot, and there are hordes of tadpoles in a pool near the river.

A mature black maple grows at the east corner of the soccer field near the townhouses, with a smaller one nearby. This species prefers moist soil and it is not far from a small wet area. Venturing into the "Big Bend" area of the main Humber meander in the summer (see map on pages 12-13) is a challenge because the trails are overgrown with shoulder-high vegetation, and the footing is unpredictable because of the hummocky ground.

A narrow strip has been naturalized between the next mown area and the river, extending right to the golf course. Slippery elms can be found here along the riverbank. Various species of butterflies have been observed near the swale that crosses the cut-over area. In early July 1994, a snipe fluttered erratically up, down, and sideways, coordinating its wingbeats with its loud beeps. This was a comical distraction display to protect its nest. Snipe formerly nested in wet areas west of Albion Rd. near where the bike path now runs. In 1995, the Scouts planted a considerable number of conifers just west of the golf course.

Horse Farm

The horse farm region contains a large meadow bordering Albion Rd. In the late 1970s, local environmental advocate Luciano Martin successfully led opposition to a proposed subdivision here. Since the field has been

allowed to naturalize, bobolinks were sighted during migration three times in different years. A former oxbow is distinguishable on the historical map. Now dry much of the year, it is flooded during spring thaw, which provides a temporary wetland where yellow flags often bloom. Contours are easily visible in winter after a dusting of snow. Near the bike trail there is perfect habitat for migrating shrikes. A. C. Bent states that *All shrikes love open country, clearings, meadows, pastures, and thickets along roads... near cultivated land*. They also prefer a few conifers for shelter, fenceposts for perching, and of course, hawthorns. Both species have been seen here. Mockingbirds choose similar conditions and there has been at least one resident bird for the past three years. A neighbourhood handyman erected a number of nest boxes in the area which attracted house wrens among other species.

Along the main Humber near the forks is a forested strip which has retained some of the original vegetation. Hog peanut, moonseed, black raspberries, Indian hemp, and honewort can be seen here. During the cool wet summer of 1992 showy tick trefoil sprang up from the seedbed, but has not been found since. Similarly, thin-leaved coneflower once blanketed a large area near Bankfield Dr. but is no longer there, although it does grow elsewhere in the study area.

Alongside the bicycle trail lies a lengthy, narrow, botanically rich remnant of the original forest situated on a sloping ridge. At the north end is an enormous double-trunked bur oak with a diameter at breast height of 1.32 metres, while close by is an old bitternut hickory. These two trees and a fallen black maple have several offspring growing in the area. There are also a few red oaks and basswood in the canopy. Shrubs include chokecherry, red osier and alternate-leaved dogwoods, buckthorn, and numerous bladdernuts. Beneath these grow Virginia waterleaf, false Solomon's-seal, Mayapple, blue cohosh, and fringed loosestrife. A moist grassy area flanks the west side of the remnant.

In the study area, residential housing extends along both sides of the valley, and most of the remaining tableland forest near Riverdale Dr. is privately owned. Most of the wooded areas are recent growth except along the slopes.

Wildlife

The study area is part of the third largest natural area in Toronto, providing habitat for far-ranging species such as pileated woodpeckers and coyotes. Indigo buntings were commonly heard in the 1960s, mourning warblers and alder flycatchers were summer residents until the late 1970s, and brown thrashers until the mid 1980s. Woodcock called each April until a private owner replaced undergrowth with an extensive lawn in the valley.

Wood thrush as a species is declining, but still sing in summer in some of

the large shady woodlots. Screech owls survive here too, and on one occasion a red phase downy young appeared. During migration, fox and white-crowned sparrows feed along the top of the slope, and often waves of warblers, vireos, flycatchers, and other species provide a spectacular display. In late winter it is always a treat to watch common mergansers and goldeneyes swimming in the fast water near the forks. The appendix (pages 28-30) contains Ron Scovell's house list of birds, augmented by the writer's observations in the study area.

An amazing variety of mammals has been observed in the area. Skunks inhabit the culverts and are, unfortunately, often encountered by dogs at night. The local beavers have built a dam across the river and a bank house with sticks piled horizontally instead of a dome-shaped structure surrounded by water. The return of some mammal species along the valley corridor might possibly be attributed to the disruption caused by the construction of Highway 407 just north of Toronto. Deer were seen on three occasions in the late 1960s, but did not return to the valley again until 1988. A fox was first sighted in 1984, and now that they have become permanent residents, rabbits are almost non-existent. Similarly, the increase of minks has probably had an impact on the muskrat population because they are now quite scarce. Strangely, chipmunks which were once relatively common in west Toronto, have been observed only three times since 1964, while a coyote has appeared slightly more often. The only big brown bat seen was fluttering back and forth above the valley during the daytime. The opossum has been extending its range eastward from Lake Erie to the north shore of Lake Ontario, so it was not surprising that on a late evening in May 1992 one was seen on Gibson Ave., but it probably would not have survived the subsequent harsh winter.

Every year garter snakes are noticed when they emerge from hibernation in April, and a few northern brown snakes are usually found later in the season. In the mid 1960s a milk snake was seen sunning on Jason Rd.

The West Humber is often teeming with creek chub which attract herons and kingfishers. At times the smaller fish swim into various storm water outlets where the water is calmer, and they are easier to see. Many of the species of fish listed were observed on only one occasion.

Vegetation

As should be expected, non-vascular plants are an important and evident feature of the study area. The alga Chara grows in the pond, and a second species, Spirogyra, flourishes in the river. The enigmatic slime mould group was represented by a spectacular large vermilion species emblazoned on a tree limb. Fungi identified were bracket fungus, inky cap, shaggy mane,

morel, puffball, and turkey tails. Lichens can be found on many trees, and mosses grow on the valley floor. Because there is little moist shade, proper habitat for ferns is scarce and only three species were seen, and these occur in very few places.

The most astonishing discovery was a single wood lily blooming in a meadow just a few metres from the path. It reappeared for several years until it was engulfed by swallowwort. It is possible that because this species grew in the Humber valley in the 1920s, it might have sprouted from the dormant seedbed. It requires a diligent search to find the few pockets of spring wild-flowers, with trout lily being the most common. Of the 282 vascular plant species listed, slightly more than half are native.

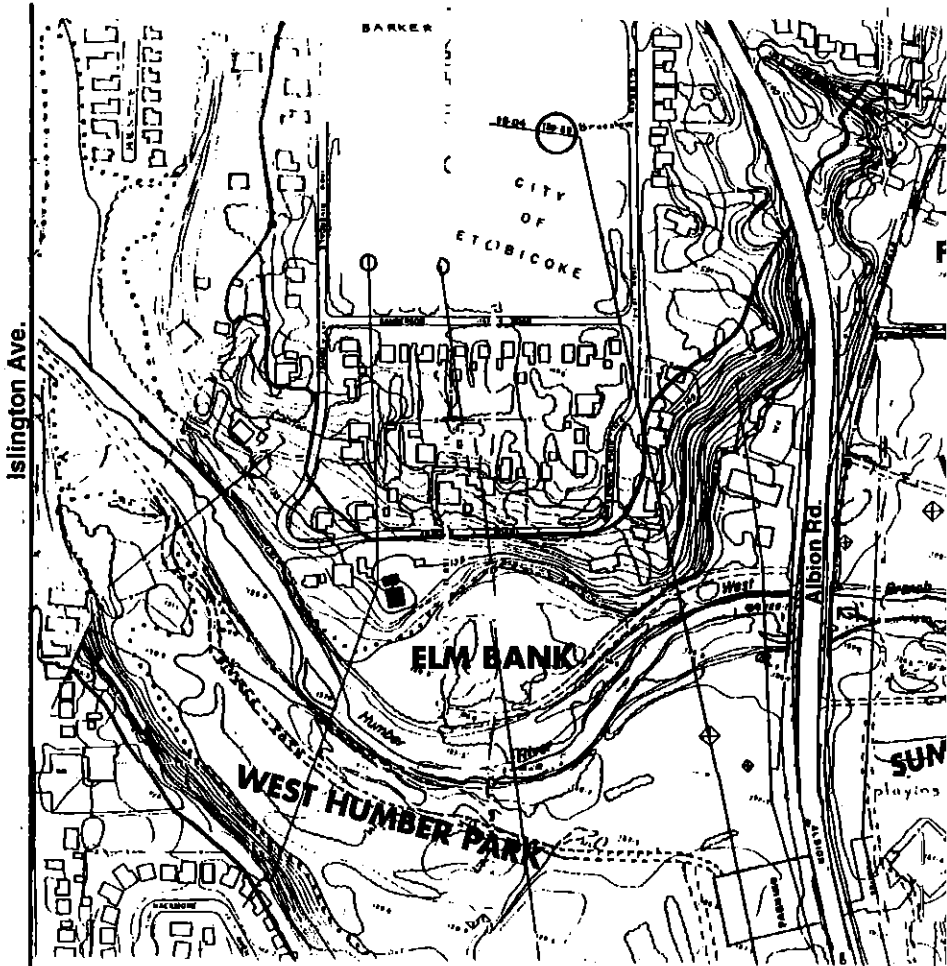
Human Uses and Abuses

The local annual Terry Fox Run begins in West Humber Park and continues westwards along the bicycle path. The most popular pursuits in the valley are walking, jogging, dog walking, cycling, and in-line skating, while some enjoy nature study, photography or fishing. Occasionally there is rafting on the main Humber, and recently in April, seven canoes were seen proceeding downstream. In winter cross country skiers use the trail, children toboggan down the small slope near Irwin Road, and pleasure skating or hockey take place on the river or pond when the water freezes.

Thistle town Collegiate students currently use the valley for cross-country running and formerly used it as a study area when a course was offered in Environmental Studies. Children from Braeburn Public School toboggan on the hill, and often hold a clean-up in the valley on Earth Day. On one occasion they planted trees near the existing Boy Scout planting. Teachers from the Science Department occasionally take classes to study biotic life in the river.

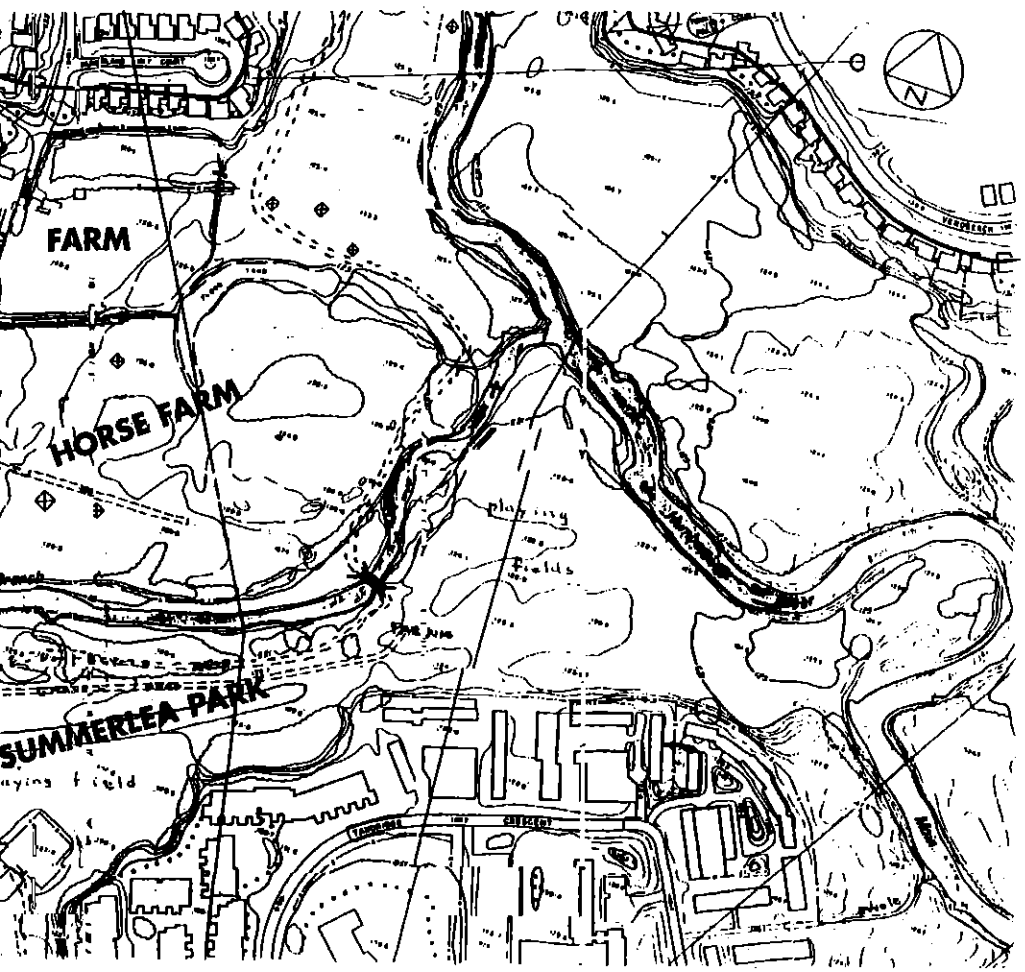
Some residents throw grass clippings, branches, and other yard waste down the slopes, and passersby have littered the natural areas near roads. Three times former Metro Councillor Lois Griffin sponsored a clean-up day in West Humber Park and many volunteers picked up debris. Teenagers sometimes hold parties in the woods and trees are cut to sit on or use for firewood. On a few occasions when the gate to the horse farm was left open, illegal dumping took place. Cyclists have dug up soil to make ramps on side trails near the main trail, and the cyclists pose a danger to other users when they re-enter the trail on a curve. A local service club donated an all terrain vehicle to the police to patrol the bike trail for motorized vehicles, and soon word spread that hefty fines were issued for violations, so problems are now greatly reduced.

Humber Forks at



Adapted from a Metropolitan Toronto and Region Conserv

at Thistle town



Conservation Authority flood plain and fill regulation map, c1977

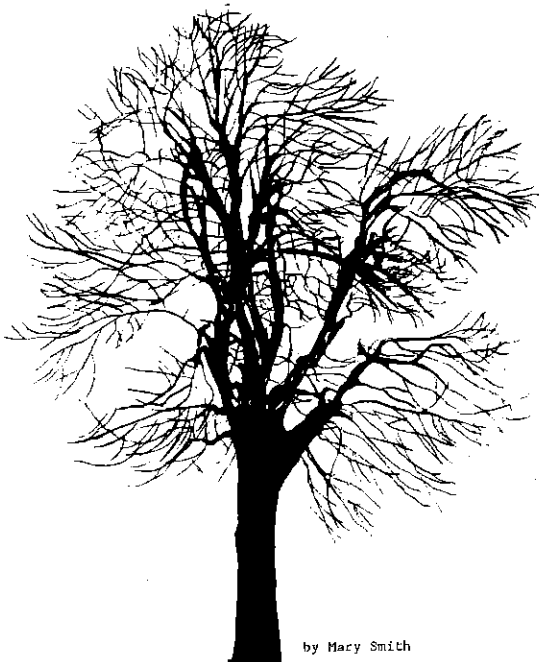
Recommendations

1. The confluence area should be left undisturbed.
2. The Elm Bank section should remain in its natural state as a wildlife corridor.
3. Any trees or shrubs planted should be native species.
4. When they are not dangerous, dead trees and branches should be allowed to decay and provide homes for hole-nesting birds and insects, and other wildlife, and eventually return nutrients to the soil.
5. The children's playground should not be sprayed again. Herbicides are far more dangerous than weeds.

Conclusion

A more thorough study of fungi, insects and pond invertebrates is needed, and the many mosses could also be classified.

The pond, confluence area, and forest remnant are irreplaceable treasures, and people and wildlife are drawn to the river. It is hoped that the Elm Bank section will retain its present wild state, and that the people of Thistle town will continue to enjoy and coexist peacefully with the abundant wildlife.



by Macy Smith

Appendix 1

Study Methods and Activities

The botany survey was conducted in the cool wet summer of 1992. During that period three outings were held to visit all four sections of the study area, allowing knowledgeable participants to assist with plant identification. Near the end of June both large meadows near Albion Rd. were sprayed, and herbicide signs erected. A few days later the area was completely mowed as well. The signs were still there during the first outing, and members were encouraged to phone Ontario Hydro and complain. So many complied that five representatives of the Toronto Field Naturalists met with Hydro officials and implored them to stop the spraying and only mow the area, or better still, allow the fields to naturalize. Ontario Hydro officials stated their intention to continue as usual, but no spraying took place the following year. A persistent resident continued to write letters until the Etobicoke Parks Department relented and allowed regeneration to take its course.

Various field guides were used for species identification and several reference books provided further information. The Local History room at Richview library was a source of considerable relevant material, and personal communication with local residents added valuable Thistle town history.



Appendix 2

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Appendix 3

Ontario's ancient clam: "*Vlasta*" *americana*

In 1951, Dr. Madeline Fritz, a curator at the Royal Ontario Museum, described some fossils of an unusual large clam (bivalve or pelecypod in scientific jargon) in the *Journal of Paleontology*. In her paper she notes that the fossils were brought to her attention by "Mrs. Helen Bush, a member of the teaching staff of the Division of Education in the Royal Ontario Museum. The material was collected by Mrs. Bruce Metcalfe [Irma Metcalfe, mother of Billie Bridgman] from Upper Ordovician strata of the Humber member of the Dundas formation, exposed along the banks of the Humber river, on the Metcalfe property at Thistletown, Ontario, Canada."

What was her reaction to these fossils? She writes: "My first impression, upon seeing the collection which consists of over twenty specimens, was that it was foreign to the district, the pelecypod in question having somewhat the appearance of a moderate sized Cretaceous *Inoceramus*." However *Inoceramus* is a clam from the Mesozoic Era, and is unknown from rocks of Ontario. So, "this idea was quickly dismissed..." especially when she noted other fossils associated with the strange clams that were well known from the Upper Ordovician, such rock strata being abundant in Ontario. But her initial instinct was prophetic of new interpretations to come (see below).

Having narrowed down the probable geologic age of the mystery clams, Dr. Fritz attempted to determine their taxonomic identity. This proved to be difficult. She wrote: "In an effort to identify this unique pelecypod every North American reference pertaining to Ordovician Pelecypoda, known to me, was consulted without avail." She decided to send some specimens to Dr. Alice E. Wilson, an expert on Ordovician paleontology at the Geological Survey of Canada in Ottawa. Dr. Wilson suggested the clams were closely related to the genus *Vlasta* which was known from the Silurian of Bohemia in Europe (the Silurian Period being the next youngest period of geologic time, after the Ordovician). This suggestion was confirmed by Dr. Aurele LaRocque of the Ohio State University who examined several specimens of the mystery clam provided by Dr. Fritz.

Dr. Fritz now felt confident to proceed with a formal naming and description of the fossils. She named the clam ?*Vlasta americana*. Her choice of "*americana*" was not explained but presumably reflects the first known occurrence of *Vlasta* in North America. But the question mark showed that she had reservations about the relationship with Silurian *Vlasta* of Bohemia. Her doubts were confirmed more than four decades later when Czech paleontologist Jiri Kriz

reviewed the genus *Vlasta* and concluded that "*Vlasta*" *americana* does not belong in the genus *Vlasta* but rather represents a new un-named genus.

That same year, 1998, I visited the Royal Ontario Museum and studied the ?*Vlasta americana* specimens and have concluded the following:

- 1) "*Vlasta*" *americana* is the largest bivalve known from the Ordovician Period.
- 2) This bivalve is a member of an extinct subclass of bivalves, the Cryptodonta, which includes the giant inoceramid bivalves of the Mesozoic. So, Dr. Fritz's "initial impression" of the inoceramid-like appearance of "*Vlasta*" *americana* was correct but she did not realize its significance at the time!
- 3) The cryptodonts (including "*Vlasta*" *americana*) typically occurred in rather deep, muddy seafloor conditions that were low in oxygen and rich in hydrogen sulfide. Studies of the cryptodonts, particularly the Mesozoic inoceramids, indicates that they likely harboured symbiotic bacteria in their tissues that utilized the otherwise poisonous hydrogen sulfide and supplied useful substances to the clam host. This was probably true for "*Vlasta*" *americana* as well and may explain why it, and many other cryptodonts, grew to large sizes.
- 4) "*Vlasta*" *americana* is indeed probably not *Vlasta*, but a new as yet un-named genus, as Dr. Kriz suspected. This unique ancient bivalve is known only from the Humber River at Thistleton, Ontario.

Dr. Paul Johnston,
Royal Tyrrell Museum of Palaeontology,
October 29, 1999

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Appendix 4

The Role of Amateur Collectors in Museum Collections

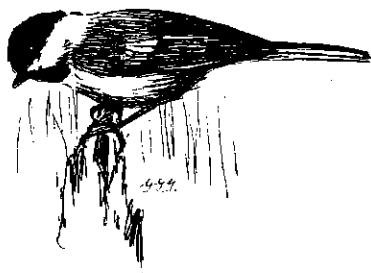
The fascinating story of "*Vlasta*" *americana* is but one example of a unique or extremely rare fossil coming to the attention of museum researchers via an amateur collector.

Amateurs often spend more time searching for fossils than professionals in the same field, and have an intimate knowledge of a particular locality(ies) or horizon. The cumulative collections and knowledge of many amateurs collecting in different areas is far more than can be achieved by the ever decreasing number of museum staff. Having greater exposure to the fossils of a particular area, amateurs are more likely to come across the extremely rare or unusual specimens. Museums are increasingly dependent on, and grateful to the work of amateurs in making accessible important specimens and even whole collections. In exchange, museum professionals can provide the amateur with specialist knowledge and access to reference sources that might not normally be available.

For many years the Royal Ontario Museum has provided a free identification service for local collectors. While most specimens that are brought in for identification are fairly commonplace, the odd rarity does appear and gets us as excited as its owners. For information on identification clinics call the Royal Ontario Museum Department of Palaeobiology or consult the ROM's web page.

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Appendix 5

Plant List

The plants are listed in the order given in the Toronto Field Naturalists' *Toronto Plant List*, 1990

HORSETAIL FAMILY

field horsetail
variegated scouring-rush

POLYPODY

ostrich fern
lady fern
spinulose wood fern

YEW

American yew

PINES

white spruce
Norway spruce
eastern hemlock
white pine
red pine

CYPRESS

eastern white cedar
common juniper

CATTAIL

broad-leaved cattail
narrow-leaved cattail

WATER PLANTAIN

water-plantain
common arrowhead

FROG'S BIT

common waterweed

ARUM

Jack-in-the-pulpit

DUCKWEED

common duckweed

LILY

orange day-lily
Turk's cap lily
yellow trout-lily
white trout-lily

Siberian squill

grape hyacinth

asparagus

false Solomon's seal

starry false Solomon's seal

lily-of-the-valley

IRIS

yellow flag

ORCHID

helleborine

WILLOW/POPLAR

white poplar

large-toothed aspen

trembling aspen

balsam poplar

eastern cottonwood

crack willow

white willow

weeping willow

shining willow

sandbar willow

narrow heart-leaved willow

pussy willow

WALNUT

butternut

black walnut

bitternut hickory

BIRCH

hop hornbeam

yellow birch

paper birch

BEECH/OAK

American beech

white oak

bur oak

northern red oak

ELM

American elm
slippery elm
Siberian elm
hackberry (planted)

MULBERRY

white mulberry

NETTLE

European stinging nettle
slender nettle
wood nettle
false nettle

SMARTWEED/BUCKWHEAT

curled dock
erect knotweed
pale smartweed
lady's thumb
Japanese knotweed

GOOSEFOOT

lamb's quarters
maple-leaved goosefoot

AMARANTH

prostrate pigweed
common green amaranth

PURSLANE

common purslane

PINK

evening lychnis
bladder campion
bouncing Bet

CROWFOOT/BUTTERCUP

red baneberry
marsh-marigold
kidney-leaved buttercup
tall buttercup
early meadowrue
tall meadowrue
tall anemone
Canada anemone
virgin's bower

BARBERRY

May-apple
blue cohosh

MOONSEED

Canada moonseed

POPPY

bloodroot
greater celandine

MUSTARD

common charlock
dog mustard
common peppergrass
pennycress
shepherd's purse
common wintercress
dame's rocket
wormseed mustard
garlic mustard
tumble mustard

SAXIFRAGE

prickly gooseberry
wild black currant
garden red currant

PLANE-TREE

sycamore (planted)

ROSE

ninebark
woodland strawberry
rough cinquefoil
sulphur cinquefoil
silverweed
white avens
yellow avens
black raspberry
wild red raspberry
purple flowering raspberry
multiflora rose
Carolina rose
smooth rose
wrinkled rose
black cherry
choke cherry
pin cherry
pear
apple
European mountain-ash
English hawthorn
native hawthorn sp

BEAN/PEA

red clover
 white clover
 alsike clover
 white sweet clover
 yellow sweet clover
 black medick
 alfalfa
 bird's-foot trefoil
 crown vetch
 showy tick-trefoil
 cow vetch
 black locust
 hog-peanut

WOOD-SORREL

common yellow wood-sorrel

GERANIUM

herb-Robert

QUASSIA

tree-of-heaven

SPURGE

leafy spurge

CASHEW

poison ivy (short)
 staghorn sumac

STAFF-TREE

spindle-tree

BLADDERNUT

bladdernut

MAPLE

Norway maple
 sugar maple
 black maple
 mountain maple
 silver maple
 Manitoba maple

HORSECHESTNUT

horsechestnut

TOUCH-ME-NOT

spotted touch-me-not
 pale touch-me-not

BUCKTHORN

common buckthorn

GRAPE

riverbank grape
 thicket creeper

LINDEN

basswood
 Dutch linden (planted)

MALLOW

common mallow

ST. JOHNSWORT

common St. Johnswort

VIOLET

common blue violet
 downy yellow violet

OLEASTER

Russian-olive

LOOSESTRIFE

purple loosestrife

EVENING-PRIMROSE

hairy willowherb
 common evening-primrose
 enchanter's nightshade

CARROT

Canada honewort
 wild carrot
 spotted water-hemlock
 wild parsnip

DOGWOOD

alternate-leaved dogwood
 round-leaved dogwood
 red-osier dogwood

PRIMROSE

fringed loosestrife
 common yellow loosestrife
 scarlet pimpernel

OLIVE/ASH

white ash
 green ash
 common privet
 common lilac

DOGBANE

spreading dogbane
common Indian-hemp

MILKWEED

swamp milkweed
common milkweed
pale swallowwort

MORNING-GLORY

common morning-glory
field bindweed
hedge bindweed

WATERLEAF

Virginia waterleaf

BORAGE

common comfrey
viper's bugloss
forget-me-not
hound's-tongue
Eurasian stickseed
Virginia bluebell

VERVAIN

white vervain
blue vervain

MINT

catnip
ground ivy
self-heal
common motherwort
wild bergamot
common bugleweed
peppermint

NIGHTSHADE

climbing nightshade
black nightshade

FIGWORT/SNAPDRAGON

square-stemmed monkey-flower
common mullein
butter-and-eggs
long-leaved speedwell

PLANTAIN

red-stemmed plantain
broad-leaved plantain

MADDER/BEDSTRAW

wild madder
small bedstraw

HONEYSUCKLE

highbush cranberry
lantana viburnum
nannyberry
common elder
red-berried elder
Tartarian honeysuckle
Morrow's honeysuckle
weigelia (planted)

TEASEL

common teasel

GOURD

wild cucumber
bur-cucumber

HAREBELL

creeping bellflower

COMPOSITE

woodland sunflower
Jerusalem artichoke
common black-eyed Susan
thin-leaved coneflower
hairy galinsoga
nodding bur-marigold
common beggarticks
common ragweed
common clotbur
common yarrow
ox-eye daisy
common tansy
scentless chamomile
common coltsfoot
zig-zag goldenrod
gray goldenrod
Canada goldenrod
narrow-leaved goldenrod
large-leaved aster
heart-leaved aster
New England aster
heath aster
swamp aster
calico aster
panicked aster

Philadelphia fleabane
rough fleabane
daisy fleabane
Canada fleabane
elecampane
spotted Joe-Pye weed
boneset
white snakeroot
common burdock
great burdock
nodding thistle
welled thistle
bull thistle

creeping thistle
spotted knapweed
common yellow hawkweed
common dandelion
common perennial sowthistle
common annual sow-thistle
spiny annual sow-thistle
Canada lettuce
prickly lettuce
unlobed prickly lettuce
common chickory
nipplewort
common yellow goatsbeard

Invertebrate List

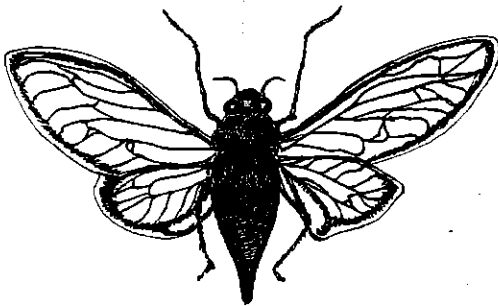
The invertebrates observed are listed according to the Toronto Field Naturalists' *Toronto Region Invertebrate List*, 1994, and *Toronto Region Butterfly List (with partial moth list)*, 1993.

GALL	Goldenrod Spindle Gall Goldenrod Sphere Gall
MOLLUSK	Land Snail Humbug Snail Slug Freshwater Snail Freshwater Clam
EARTHWORM	Dew Worm
SPIDER	Orb-web Spiders Garden Spider
PSEUDOSCORPION	Pseudoscorpion sp.
HARVESTMAN	Harvestman sp.
MITE	Red Spider Mite
CRUSTACEAN	Sow Bug Crayfishes Eastern Crayfish Chimney Crayfish
INSECT	Silverfish

DAMSELFLY	Mayfly Ebony Jewelwing Bluet
DRAGONFLY	Common Green Darner Common Whitetail Ruby Meadowfly
GRASSHOPPER	Grasshopper sp. Katydid
CRICKET	Field Cricket Praying Mantis Earwig
TRUE BUG	Water Boatman Water Strider Small Milkweed Bug Leaf-Footed Bug sp. Squash Bug Cicada
HOPPER	Spittlebug Leafhopper Aphid Scale Insect
BEEBLE	Whirligig Beetle 2-spotted Ladybird Beetle Red Milkweed Beetle Elm Leaf Beetle June Beetle
BUTTERFLY	European Skipper Black Swallowtail Tiger Swallowtail Cabbage White Common Sulphur Fritillary sp. Comma Mourning Cloak Milbert's Tortoiseshell Painted Lady Red Admiral White Admiral Monarch



MOTH	Blinded Sphinx Cecropia Moth Polyphemus Moth Luna Moth Inchworm Tent caterpillar Isabella Tiger Moth/Woollybear Underwing Moth Gypsy Moth
FLY	Crane Fly Mosquito Black Fly Robber Fly Leaf Miner Fly House Fly
WASP	Ichneumon Hornet Potter Wasp Bald-faced Hornet Yellow-jacket Paper Wasp Mud Dauber Wasp
ANT	Carpenter Ant
BEE	Bumble Bee Honey Bee
CENTIPEDE	House Centipede Centipede
MILLIPEDE	Millipede



Vertebrates Observed

This list follows the Toronto Field Naturalists' *Toronto Region Vertebrate List*, 1993.

FISHES

Carp
Blacknose Dace
Creek Chub
Bluntnose Minnow
White Sucker
Northern Hog Sucker
Northern Brook Silverside
Rock Bass
Johnny Darter
Least Darter

AMPHIBIANS

American Toad
Green Frog
Leopard Frog

REPTILES

Snapping Turtle
Midland Painted Turtle
Eastern Milk Snake
Northern Brown Snake
Garter Snake

MAMMALS

Star-nosed Mole
Big Brown Bat
Little Brown Bat
Raccoon
Mink
Striped Skunk
Coyote
Red Fox
Groundhog
Grey Squirrel
Red Squirrel
Eastern Chipmunk
Beaver
White-footed Mouse
Meadow Vole
Muskrat
Norway Rat
House Mouse
Eastern Cottontail
Whitetail Deer
Virginia Opossum



Birds Observed - 1963 - 1999

The following list is arranged according to the order given in the Federation of Ontario Naturalists' *Field Checklist of Ontario Birds*, 1999.

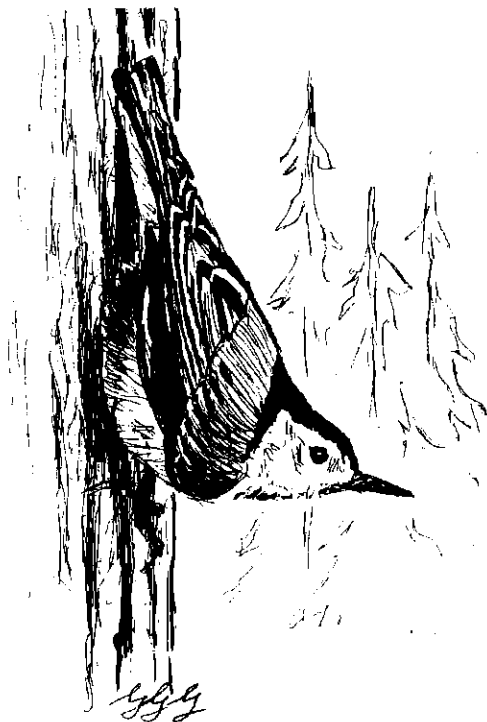
Legend

PR	permanent resident in the study area
M	migrant
SR	summer resident in the study area (currently)
FSR	former summer resident (during some period since 1963)
WR	winter resident
RM	rare migrant
O	occasional
R	rare
T	transient

Common Loon	M	Rough-legged Hawk	O
American Bittern	O	American Kestrel	PR
Great Blue Heron	M	Peregrine Falcon	R
Great Egret	R	Ring-necked Pheasant	PR
Green Heron	FSR	Ruffed Grouse	R
Black-crowned Night-Heron	SR	Semipalmated Plover	O
Turkey Vulture	M	Killdeer	SR
Snow Goose	RM	Greater Yellowlegs	M
Canada Goose	PR	Lesser Yellowlegs	M
Wood Duck	M	Solitary Sandpiper	M
Gadwall	M	Spotted Sandpiper	SR
American Black Duck	FSR	Upland Sandpiper	R
Mallard	PR	Common Snipe	OSR
Blue-winged Teal	M	American Woodcock	O
Northern Shoveler	M	Herring Gull	T
Northern Pintail	M	Ring-billed Gull	T
Bufflehead	M	Caspian Tern	O
Common Goldeneye	M	Common Tern	O
Common Merganser	M	Black Tern	R
Hooded Merganser	M	Rock Dove	PR
Osprey	M	Mourning Dove	PR
Northern Harrier	M	Black-billed Cuckoo	OSR
Sharp-shinned Hawk	WR	Yellow-billed Cuckoo	OSR
Cooper's Hawk	WR	Eastern Screech Owl	PR
Northern Goshawk	WR	Great Horned Owl	PR
Red-shouldered Hawk	M	Snowy Owl	O
Broad-winged Hawk	M	Long-eared Owl	O
Red-tailed Hawk	PR	Northern Saw-whet Owl	O
		Common Nighthawk	M (FSR)

Whip-poor-will	M	Golden-crowned Kinglet	M
Chimney Swift	O (FSR)	Ruby-crowned Kinglet	M
Ruby-throated Hummingbird	M (FSR)	Blue-gray Gnatcatcher	R
Belted Kingfisher	SR	Eastern Bluebird	R
Red-headed Woodpecker	R	Veery	M
Red-bellied Woodpecker	OWR	Gray-cheeked Thrush	M
Yellow-bellied Sapsucker	M	Swainson's Thrush	M
Downy Woodpecker	PR	Hermit Thrush	M
Hairy Woodpecker	WR	Wood Thrush	SR
Northern Flicker	PR	American Robin	SR
Pileated Woodpecker	T	Varied Thrush	R
Olive-sided Flycatcher	R	Gray Catbird	SR
Eastern Wood-Pewee	SR	Northern Mockingbird	PR
Yellow-bellied Flycatcher	M	Brown Thrasher	O (FSR)
Alder Flycatcher	M	European Starling	PR
Willow Flycatcher	SR	Bohemian Waxwing	R
Least Flycatcher	M (FSR)	Cedar Waxwing	SR
Eastern Phoebe	M	Blue-winged Warbler	R
Great Crested Flycatcher	SR	Golden-winged Warbler	R
Eastern Kingbird	SR	Tennessee Warbler	M
Loggerhead Shrike	M	Orange-crowned Warbler	O
Northern Shrike	O	Nashville Warbler	M
White-eyed Vireo	R	Northern Parula	O
Yellow-throated Vireo	R	Yellow Warbler	SR
Blue-headed Vireo	M	Chestnut-sided Warbler	M (FSR)
Warbling Vireo	SR	Magnolia Warbler	M
Philadelphia Vireo	M	Cape May Warbler	M
Red-eyed Vireo	SR	Black-throated Blue Warbler	M
Blue Jay	PR	Yellow-rumped Warbler	M
American Crow	PR	Black-throated Green Warbler	M
Common Raven	R	Blackburnian Warbler	M
Horned Lark	O	Pine Warbler	M
Purple Martin	FSR	Palm Warbler	M
Tree Swallow	FSR	Bay-breasted Warbler	M
Northern Rough-winged Swallow	M	Blackpoll Warbler	M
Bank Swallow	SR	Cerulean Warbler	R
Cliff Swallow	OSR	Black-and-white Warbler	M
Barn Swallow	SR	American Redstart	M
Black-capped Chickadee	PR	Ovenbird	M
Boreal Chickadee	R	Northern Waterthrush	M
Red-breasted Nuthatch	WR	Kentucky Warbler	R
White-breasted Nuthatch	PR	Connecticut Warbler	R
Brown Creeper	M	Mourning Warbler	O (FSR)
Carolina Wren	R (FSR)	Common Yellowthroat	SR
House Wren	SR	Hooded Warbler	R
Winter Wren	M	Wilson's Warbler	M

Canada Warbler	M	Red-winged Blackbird	SR
Scarlet Tanager	M	Eastern Meadowlark	SR
Eastern Towhee	M	Rusty Blackbird	M
American Tree Sparrow	WR	Common Grackle	SR
Chipping Sparrow	SR	Brown-headed Cowbird	SR
Field Sparrow	M	Baltimore Oriole	SR
Savannah Sparrow	SR	Pine Grosbeak	R
Fox Sparrow	M	Purple Finch	M
Song Sparrow	PR	House Finch	PR
Lincoln's Sparrow	M	Red Crossbill	R
Swamp Sparrow	M	White-winged Crossbill	R
White-throated Sparrow	WR	Common Redpoll	O
White-crowned Sparrow	M	Hoary Redpoll	R
Dark-eyed Junco	WR	Pine Siskin	WR
Lapland Longspur	R	American Goldfinch	PR
Northern Cardinal	PR	Evening Grosbeak	O
Rose-breasted Grosbeak	SR	House Sparrow	PR
Indigo Bunting	M (FSR)		
Dickcissel	R	Total number of species	
Bobolink	M (FSR)	observed: 186	



Aids to Enjoying the Site

Recommended Field Guides

For amphibians and reptiles: Amphibians and Reptiles of Metro Toronto, 1982 – Inventory and Guide, by Bob Johnson, Toronto Field Naturalists, 1983.

For birds: Birds of North America, by C.S. Robbins et al, Golden Press, New York, 1983.

For insects: Audubon Society Field Guide to North American Insects and Spiders, by L.M. Milne, Alfred A. Knopf, New York, 1980.

For plants: Newcomb's Wildflower Guide, by Lawrence Newcomb, Little, Brown and Co., Boston, Toronto, 1977, *or*

Trees, Shrubs and Flowers to Know in Ontario, by S. McKay and P. Catling, J.M. Dent & Sons (Canada) Ltd., Toronto, 1979.



and PLEASE!

- Take time to stop, look and listen.
- Stay off steep slopes and out of wet areas; these are fragile.
- Leave plants, animals and artifacts for others to enjoy too.
- Make notes, make sketches, take photographs.
- Take away only litter, and happy memories!

Years ago	Duration	PERIODS	ERAS
millions			
1	1	QUATERNARY Recent Pleistocene	CENOZOIC
	12	TERTIARY Pliocene Miocene Oligocene Eocene Paleocene	
	12		
	11		
	22		
63	5		
	72	CRETACEOUS	MESOZOIC
135	46	JURASSIC	
181	49	TRIASSIC	
230	50	PERMIAN	
280	30	PENNSYLVANIAN	
310	35	MISSISSIPPIAN	PALEOZOIC
345	60	DEVONIAN	
405	20	SILURIAN	
425	75	ORDOVICIAN	
500	100	CAMBRIAN	
600			

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