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Local History

AN ECOLOGICAL STUDY
OF
GRENADIER POND
AND
THE SURROUNDING AREAS OF
HIGH PARK - TORONTO

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1976

NOTE

During the summer of 1976 General Foods Limited sponsored an ecological study of Grenadier Pond and the surrounding areas of High Park. This study was suggested by the senior author, Allan Wainio, Ministry of Natural Resources, Maple, and it was he who supervised in general the students who carried out the field work. He was also responsible for proof reading, editing and rewriting the report.

This is the fourth year that General Foods Limited has directly involved itself in environmental projects within Metropolitan Toronto. In 1971 they sponsored a cleanup of the Don River in Metro Toronto. In 1972 they financed a cleanup of the Humber River in Metro Toronto and a fish survey of the entire Humber River watershed.

In 1973 General Foods Limited sponsored three separate projects in Metro Toronto - a fish survey of Toronto Island, a biological survey of three Toronto ravines and a biological survey of the Rouge River mouth marsh.

During the 1976 ecological survey John Barrie, the crew leader, was responsible for the aquatic studies of Grenadier Pond. Jim Rowsell studied the bird and mammal life on and around the pond while Karen McIntosh carried out thorough botanical studies of both aquatic and terrestrial plants in High Park. All three students are to be commended for the excellent work they did.

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ABSTRACT

Some of the plant species and even whole plant communities found in High Park are unique for the Toronto region.

The hillside on the east side of Wendigo Ravine and north of Grenadier Pond is perhaps the area that makes High Park truly unique. Here the open oak woodland growing in dry, acid, sandy soil, harbours many unusual plants which are western species and some which are at the northern limits of their distribution. This forest type represents the last extensive, open oak woodland in the Toronto region and probably in York Region.

The Wendigo Way Ravine, with its rich variety of shrubs and woodland plants, has a plant profile similar to many of the Toronto ravines. It is an excellent area for birds.

The reduced marsh areas do not contain any unusual plant species but they are important wildlife areas and they do harbour plant species that are found nowhere else in the park and some which are not found elsewhere in the city limits. The most interesting vegetation on the west side of Grenadier Pond is to be found in the narrow strip of marshline vegetation.

Although much of what was present in High Park has been destroyed, pockets of interesting vegetation remain, despite their proximity to heavily used recreational areas. Some natural areas which have no unusual plants act as buffer zones between recreational areas and those areas where unusual plants are growing. These buffer areas may seem small and insignificant but they are extremely important by allowing unusual plants to survive and possibly spread.

The occasional indicator plant of the Carolinian zone grows in the Park.

The areas where rare plants exist act as reservoirs for these plants and for that reason these sites should not be ignored but kept intact and undisturbed.

Within its narrow confines the threatened Spring Road Ravine exhibits a microclimate which has created a boreal environment favourable to more northern plant species.

Many areas in the park which are currently being mowed, but have not been ploughed and sodded have the potential to be restored to their natural state.

Bird life in the park continues to show a good standard of diversity. Good habitat yet exists for a variety of resident or seasonally resident birds (about 70 species). Some rare sightings have been made and there are many species which are not found in the surrounding urban areas and smaller parks. Some 65 bird species were seen this summer and some 200 have been observed here during any one year. The west bank of Grenadier Pond provides the most ideal habitat for birds.

A variety of large mammals (seven species larger than a chipmunk) and of small mammals live in the Park. No frogs were observed, though at least one species of toad is present. There are probably four species of turtle and the garter snake.

There are many people who have lived on the west edge of the Park for ten to thirty years and have taken immense enjoyment from this unique location. They stress the importance of keeping this west bank in its present condition.

The pond is highly eutrophic with high nutrient levels and a high rate of primary production. Being a productive body of water Grenadier Pond supports a large population of warmwater fish, 17 different species.

Fishing pressure at the pond is quite heavy and anglers get good catches. Sunfish and crappies make up a large percentage of the catch. Largemouth bass and white perch are the major game fish caught.

Largemouth bass, which are stocked, are thriving in the pond and are also reproducing naturally.

HISTORY

Although High Park has been a favourite recreational area for generations of Torontonians, it did not come into existence until 1873, when the late Mr. John G. Howard (then City Surveyor) donated 165 acres of land to the City of Toronto. This land comprised the central section of the park, running from Bloor Street to the waterfront. With this deed came several stipulations; that the Howards would have free use of their residence (now Colbourne Lodge) during their lifetime, that the City would maintain the family burial plot forever, and that the area would become known as "High Park". This park was to be for the "free use of the citizens of Toronto" and has remained so.

In 1876, an additional 172 acres to the east of the Howard donation was purchased from the Ridout family for $15,000.00. However it was not until 1930 that 71 acres (including the 35 acres of water known as Grenadier Pond) was added to the park. This land was purchased from the Chapman estate for $150,000.00. The final 2 acres of the park on the west bank of Grenadier Pond were added in 1967, when the Village of Swansea became incorporated into the City of Toronto.

Eleven acres of the park, consisting mainly of the southern marshy edges of Grenadier Pond, were given to the Municipality of Metropolitan Toronto when the Queensway West extension was built

Up until 1955, High Park remained in a fairly natural state with little or no development being undertaken. However, in 1955 "the city decided that High Park should be developed in order to make it available to all citizens rather than a selected few who found it of particular interest in the undeveloped state". Since then, the hillside gardens have been developed, as well as numerous recreational facilities such as playgrounds, the animal compounds, tennis courts, swimming pools and a toboggan run. This has created a vast recreational facility for thousands of Toronto residents, but with this development, much of the natural areas of the park have been destroyed or altered, and today only the outer perimeter of the park remains similar to the way it once was.

PHYSICAL FEATURES

1. INTRODUCTION

High Park is located at 43° 38' latitude, 79° 28' longitude at the western limits of the city of Toronto. It consists of 375 acres, subdivided into 55 acres of pond water, 180 acres of woodland and 140 acres of public recreation area, parking lots, zoo etc. There are four small ponds at the east side of the park. Grenadier Pond, an elongated shallow water body of 47 acres is aligned generally north-south and is at the west side of the Park. At one time the pond in the south east corner of High Park was known as Catfish Pond but it is now known as the Lower Duck Pond. The pond just west of Grenadier Pond and across Ellis Avenue is now known as Catfish Pond.

Grenadier Pond extends from the Queensway in the south, to almost Bloor St. in the north and is fed by a stream whose waters originate primarily from storm sewers and run-off from the considerably higher land to the west and east of the pond. To the south, several roadways, a railway and Sunnyside Beach form a 990 foot wide, low flat barrier separating the pond from Lake Ontario. Water flows to the lake from a surface outflow at the southwest corner of the pond; some of it being rerouted into a Stelco plant. Water from Catfish Pond enters Grenadier Pond about 30 meters north of this outflow.

2. HOW GRENADIER POND WAS FORMED

The ponds in the High Park area including Catfish Pond, Grenadier Pond and the lower Duck Pond are all fed by streams which at one time extended north of Bloor St. At an earlier and lower geological stage of Lake Ontario, the stream valley continued south and there were no ponds (Coleman, 1933). The ponds now found in High Park were at one time joined to Lake Ontario and it is probable that these ponds which are straight edged at their southern tips were formed by the building of a sandbar by Lake Ontario (Coleman, 1933).

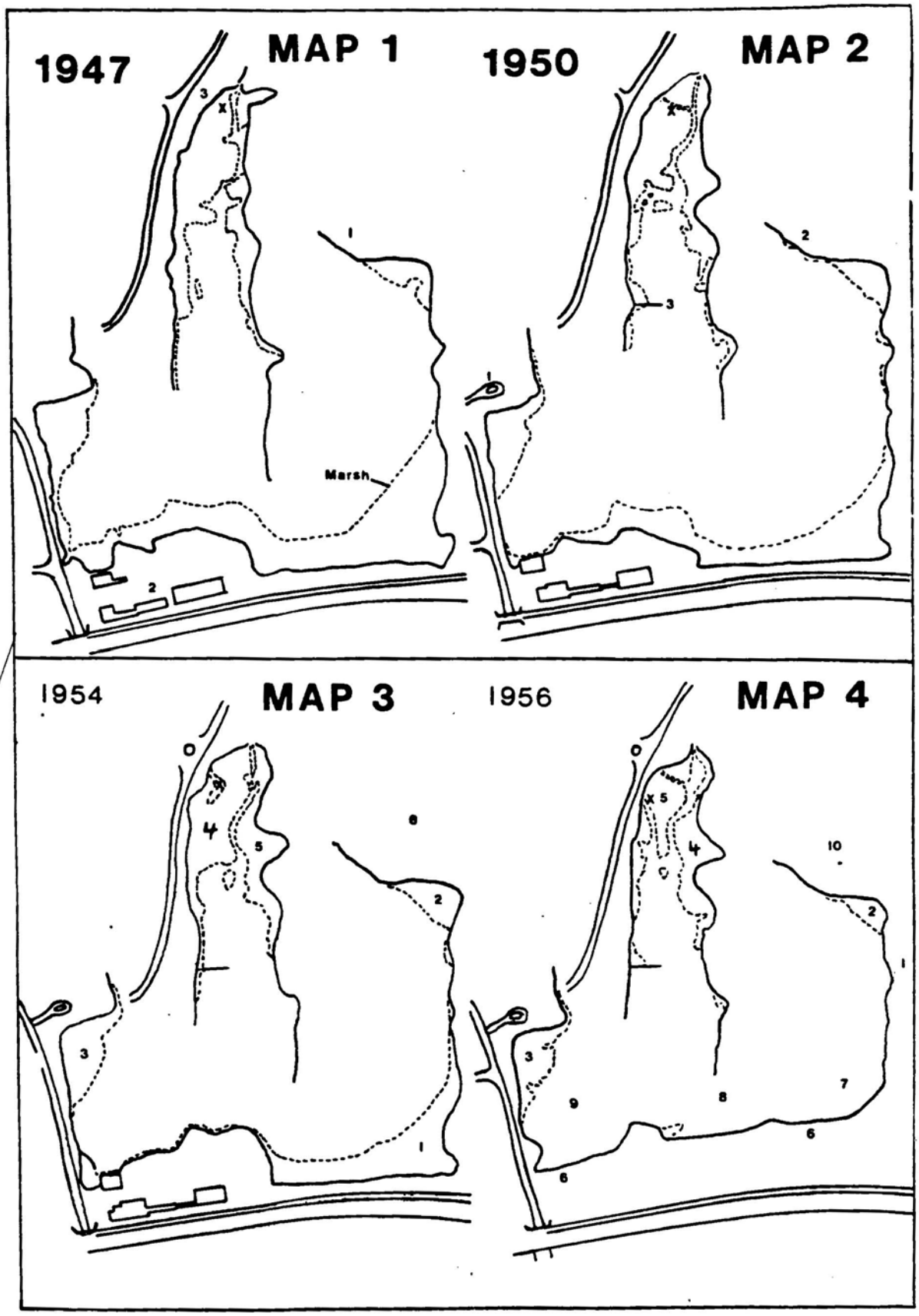
John Howard at one time used stumps to form a small island in the bullrushes of Grenadier Pond (McManus, 1975) and it is thought that he may have used stumps to fill in the sandbar along the south end of the park (personal communication, local residents). The pond has since been reduced in size by fill for the construction of the railway and streets along the lakeshore. The park foreman, Mr. Bob Mackie (personal conversation) reported that a bulldozer sank into mud at the south end of Grenadier Pond during fill operations for the Queensway.

AERIAL PHOTO MAP SERIES INTERPRETATION

The series of accompanying maps are 1:1 tracings of 1:4800(±) aerial photo mosaics and represent only the southern most and northern most vicinities of Grenadier Pond. The major purpose of the series is to show the land use changes in these areas, to demonstrate their effects on the pond and to detail changes in readily observable vegetation patterns in the pond. The central section of the pond has been subject to only a few changes over the years. Because the various aerial photos were taken from somewhat different angles and shoreline vegetation often hides the actual banks, the shorelines are slightly approximate. One of the authors, Jim Rowsell, has had previous experience in aerial photo interpretation at the university level.

Map 1, 1947

This was the earliest air photo available at the University of Toronto Map Library. Both north and south areas have considerable aquatic vegetation and over 75% of the pond margin is in a "natural" state, though unpaved trails exist around it. Heavy-use areas (judging from bare spots observable on the photo) include the site near the present location of the Purple Martin nesting house (Map Reference 1) and also just north of the location of the present day bandstand where a building was located. There was also a boat dock nearby. The buildings at the SW corner of the pond form the


1947
MAP 1
1950
MAP 2
Marsh
1954
MAP 3
1956
MAP 4

High Park Water Pumping Station (Map Reference 2). A water intake pipe was directed from Lake Ontario (due south) to the Station at this time. There seems to have been few or no artificial pond margins.

The site of the present day boathouse also shows considerable use, with trails from the hilltop converging on it, but not until 1960 does a building appear at this location.

A sewage pumping station at Map Reference 3 was present and still (1976) is. A clear channel of water adjacent to it in the north marsh becomes increasingly apparent over the years. (See Map References X in the series).

Housing along the entire west bank of the pond and parallel to Wendigo stream are present and long established and appear very much as it does today. The few sites of house construction over the years were small and did not seem to alter the slope or shoreline for the entire western bank of the pond. Trails were small and difficult to distinguish and still are today.

Map 2, 1950

Three years later we find somewhat less shore marsh in the south end and the site around the Water Pumping Station seems to have been consolidated. A house has been built adjacent to the circular driveway (Map Reference 1). A track along the east side is much wider and increased usage at point 2 is obvious. The trails along the entire eastern side show increased usage, as does the north end, though little change in marsh area size is evident. A log which is still (1975) in situ at Point 3 is a foundation for a section of associated marsh.

Map 3, 1954

Considerable changes are evident at the south end where the entire south end marsh appears very heavily vegetated and parallel lines, possibly trails, extend toward the water margin, which is still natural (Point 1). Although no sign of construction can be seen, this area gives the visual impression that it has become very dense and has minimal water depth. Areas of marsh at points 2, 3, 4 and 5, remain virtually the same in size.

Other parts of the park have also changed: a tennis court has been added and baseball diamonds and playing fields are more established. Evidence of very heavy usage indicating an erosion problem occurs at point 6. This site seems to be the most popular access point to the pond.

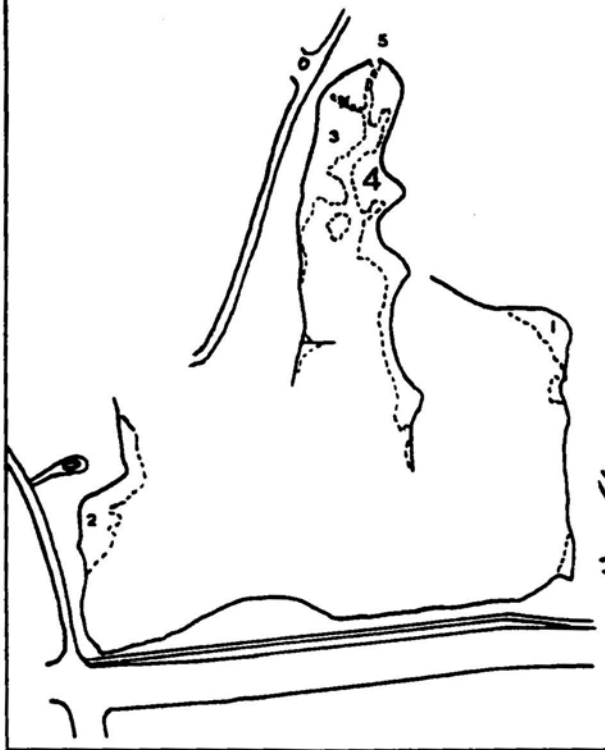
Not shown on the map is a rather extensive section of shore marsh (also apparent in previous photos) between the site of the present day boathouse and pumphouse for the Hillside Gardens. Landfilling some time between 1954 and 1956 eradicates this.

Map 4, 1956

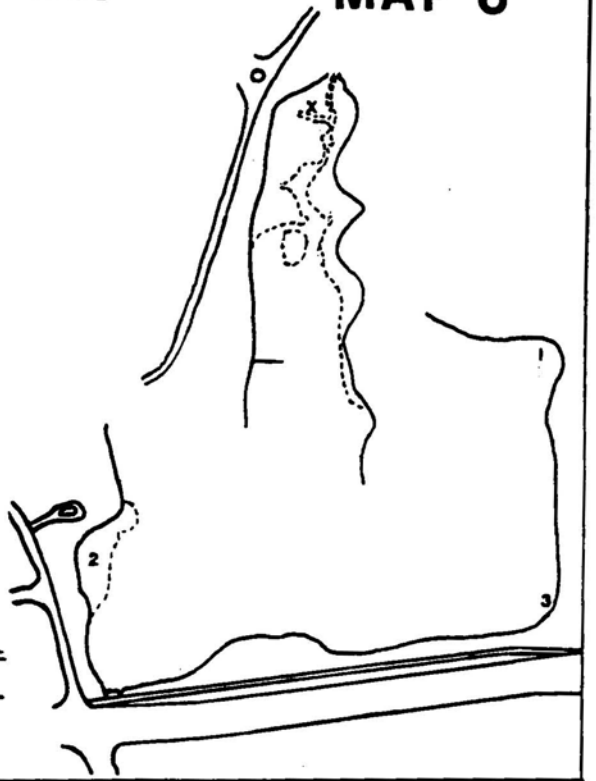
The straight section of the pond on the west side at the south end shows stable utilization. The marsh areas at Points 2, 3 and 4 show little size change but that at Point 5 is somewhat reduced in size. However, in the course of constructing The Queensway (completed on the 1960 air photo), large amounts of fill have been dumped along the entire south shore (Points 6). In the aerial photo, plumes of silt extend well into the pond from then active dumping operations (See Map locations 7, 8, 9). Approximately 11 acres of the pond have been filled in. The Water Pumping Station is being disassembled.

At the same time, construction of the Hillside Gardens is starting and massive areas of bare earth between the present day boathouse and Location 10 are tokens of this.

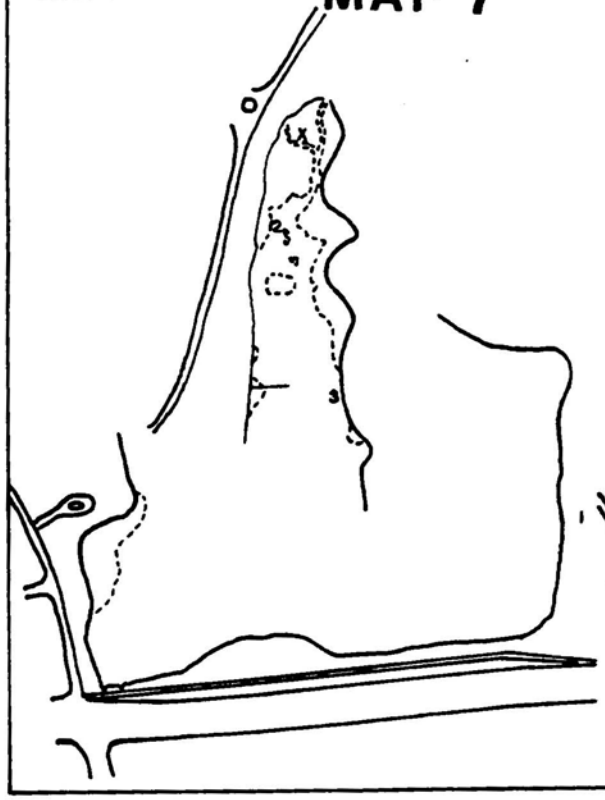
1960 **MAP 5**



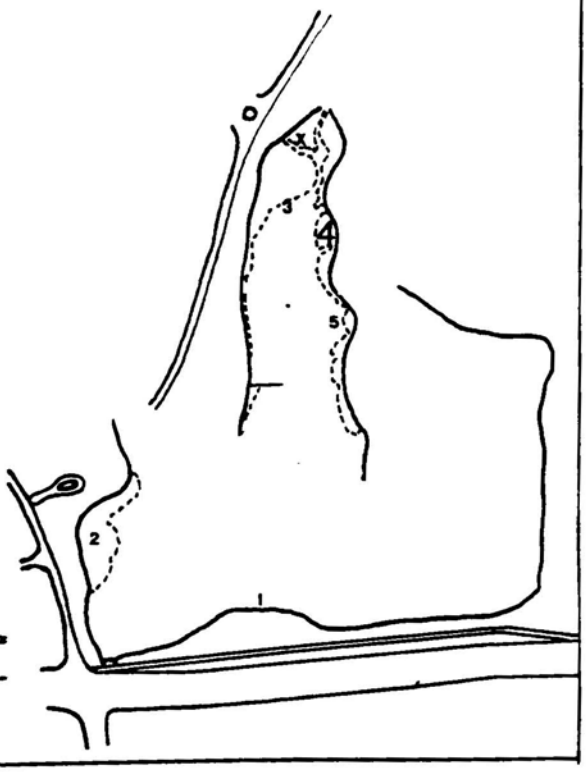
1963 **MAP 6**



1964 **MAP 7**



1967 **MAP 8**



Filling in of the marshy shoreline near the boathouse as mentioned earlier, has been completed.

Trails show increased usage leading to the site of the boathouse southward to strongly eroded hillside sections at Point 10. North of the boathouse things are very much the same as in 1954.

Map 5, 1960

By this time The Queensway has been completed as have many other alterations. Essentially all of the Hillside Gardens has been laid out; a check on almost all eroded areas has been realized with the exception of the artificial rivulet which enters the pond just south of the now completed boathouse. The bandstand is present as is the artificial rivulet to its south. Distinct concrete walkways and the single large paved roadway loop are in evidence. At the same time a concrete wall exists uninterrupted from just south of the northern artificial rivulet to the extreme SW corner, thus reducing the perimeter of natural earth bank shoreline to about 50% of its previous value.

The marsh at Points 1 and 2 are smaller and much less densely vegetated. The entire south bank has no trace of marginal vegetation now that filling has been completed. The northern marsh at Point 3 is only slightly smaller but the adjacent portion at Point 4 is noticeably smaller, less dense and does not extend along the east bank as far southward as previously.

There is now a single distinct path north from the boathouse to the bridge at Point 5. Trails leading down to this section on the eastern hillside also seem more heavily used. A sidewalk parrallel to The Queensway exists and a distinct outlet is visible in the SW corner of the pond.

In other parts of the park, facilities for recreation have been extended, sidewalks and roadways improved and the large nursery and greenhouse area completed. Construction near Catfish Pond to the west has removed a large amount of forest and some natural shoreline.

Map 6, 1963

By this time the good-sized marsh which existed at Point 1, has been entirely eliminated. The marsh at Point 2 has become re-established more densely since The Queensway construction and filling has been completed, although it is now bordered by a concrete bank along half its perimeter.

The small marsh area at Point 3 has been filled in. This filling was not extensive but did involve dumping from this point right along to Point 1 and a concrete walkway adjacent to the concrete bank has been added. This filling effectively straightened this section and removed the previously sinuous shoreline.

At the north end the channel (marked X) near the sewage pumphouse, is more distinct but the overall area in marsh has changed little. A walkway is partly completed north from the boathouse to the bridge but hillside trails remain about the same in size and number. The artificial rivulet entering the pond near the boat-house has been completed and there are no signs of erosion around the pond.

Other portions of the park look more manicured and a swimming pool has been constructed. Large apartment buildings now border the north west sides of Catfish Pond.

Map 7, 1964

The southern end of the pond appears much the same as in 1963. The layout for a road at Points 1 are now apparent. At the north end, however, substantial marshy areas have been reduced in size at Points 2 and 3. Hillside trails appear about the same.

Map 8, 1967

By this time the paved walkway along the entire southern edge has been completed (Point 1). The marsh area at Point 2 remains

about the same. At the north end there is considerably less marsh at Points 3, 4 and 5. At Point 4 an indented section of shoreline has been straightened out by filling and fill has also been dumped to form a stopping rampart for the toboggan run which makes its appearance from Wendigo Way to the pond as a straight swathe of cleared hillside. The marshy areas that do remain on the east side are less densely vegetated.

Map 9, 1968

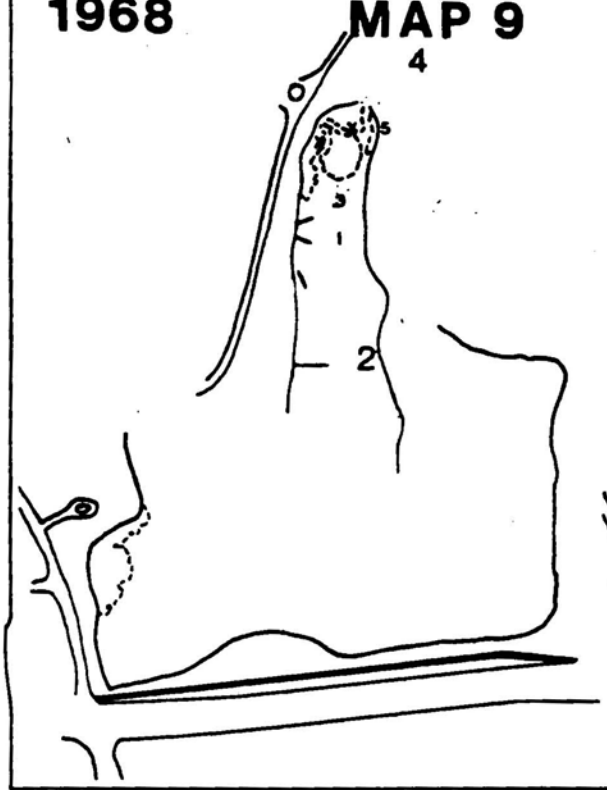
Again there is little or no change at the south end. The northern marsh is even more reduced in size; the main marsh area is now more separated from the shore to the north and west (Points X) and the now completed toboggan rampart has resulted in even more straightening of the shoreline and reduction of marsh plants over the whole distance at Points 1 and 5. The aerial photo shows silt plumes in areas 2 and 3 associated with the combined filling and with a dump truck access road at Point 4. Another larger plume extends along the east bank further to the south of Point 2 and is associated with landfilling and walkway construction north of the boathouse.

Map 10, 1969

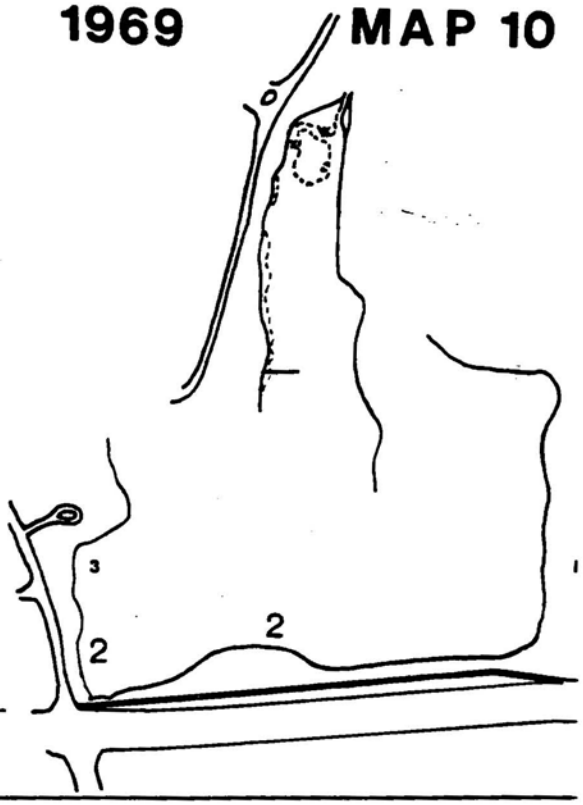
Construction of a road along the east side at the south end of the pond has just been started (Point 1). A concrete walkway replaces the previous paved one for the width of the south end (Point 2) and extends around behind the slightly smaller marsh at Point 3. It is only partially completed on the western side.

In the northern section the marsh is smaller yet and the channel around it (X) is wider. The truck access road described above has been removed and the paved walkway from the bridge to the boathouse has been completed. The shoreline is very regular at this time and the perimeter of natural shoreline appears to be about one-third of its 1947 length. Other areas of the park have not changed very much.

1968 MAP 9



1969 MAP 10



1972 MAP 11

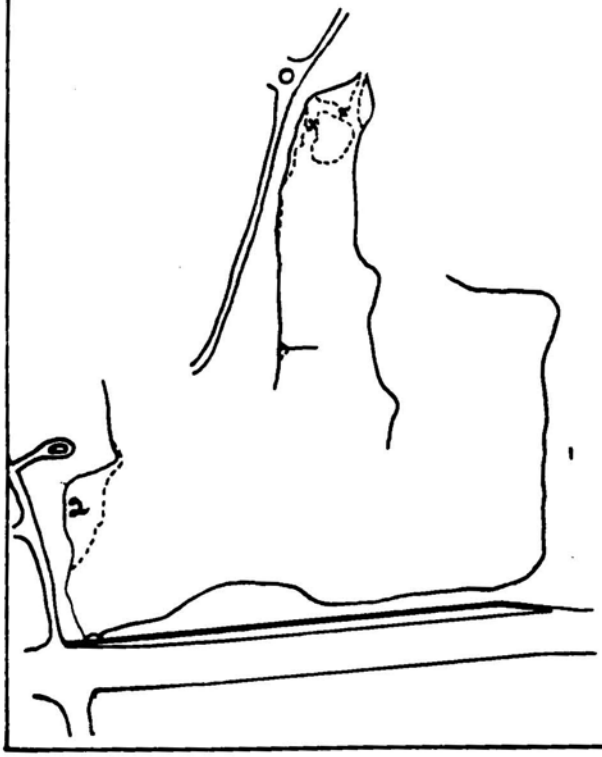


Table 1

WATER FLOW RATES AT GRENADIER POND

1976

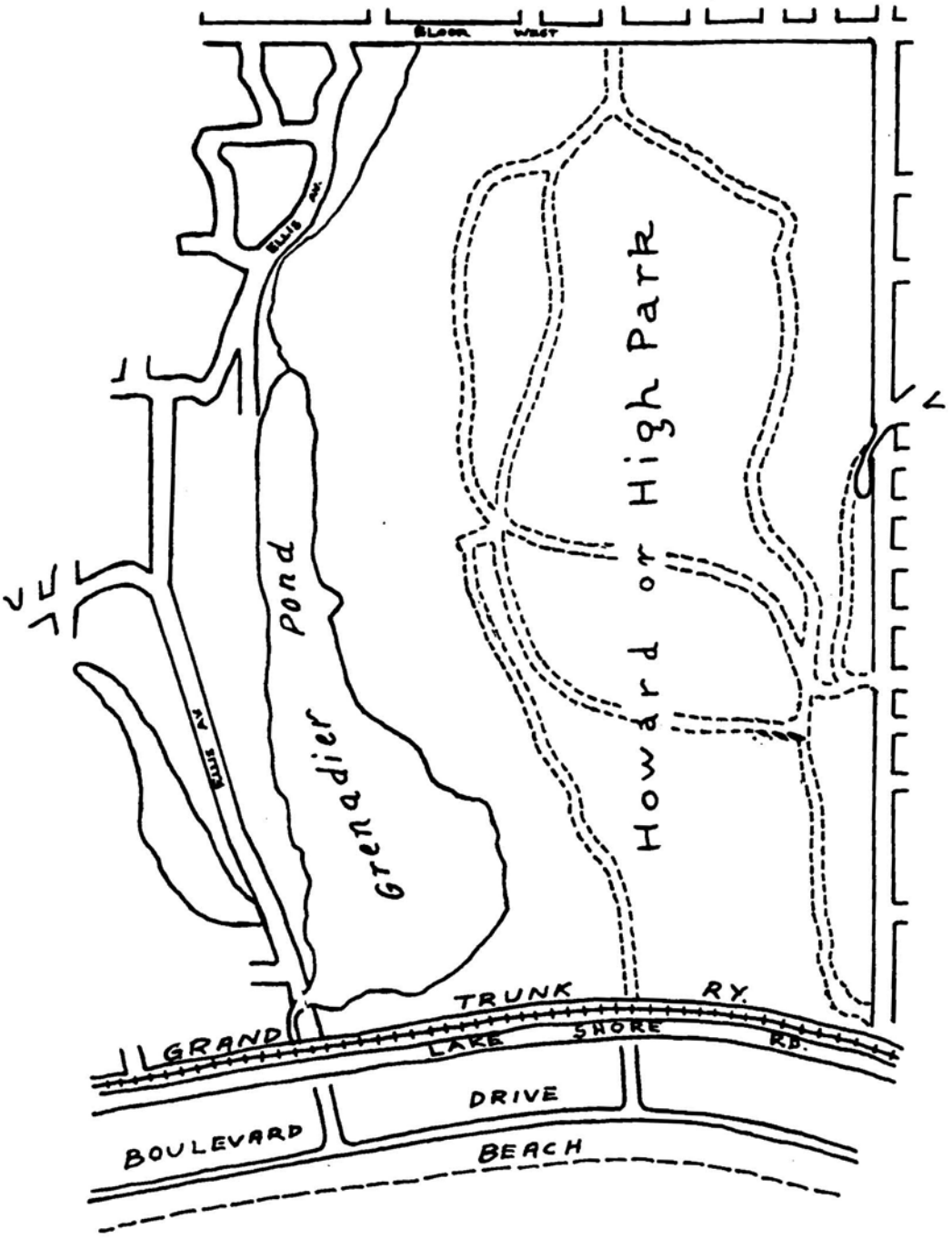
(Cubic Feet Per Second)

Date	Inlet	Catfish Pond Inlet	Outlet
June 11	.6	.5	2.1
June 21	1.7	.2	2.1
June 29	1.0	.3	4.0
July 5	1.0	.2	2.1
July 13	1.0	.3	3.2
July 19	1.0	.1	1.1
July 26	.8	.2	1.1
Aug. 2	1.0	.2	1.1
Aug. 11	1.0	.5	.5
Average	1.0	.3	1.9

MAP 12

Scale: 1:15,000 (app.)

"mid-nineteenth century"



Map 11, 1972

The most recently available air photo mosaic shows the road at Point 1 now completed, as is the concrete walkway along the eastern side at the south end. The marsh at Point 2 has recovered slightly in size to near former dimensions.

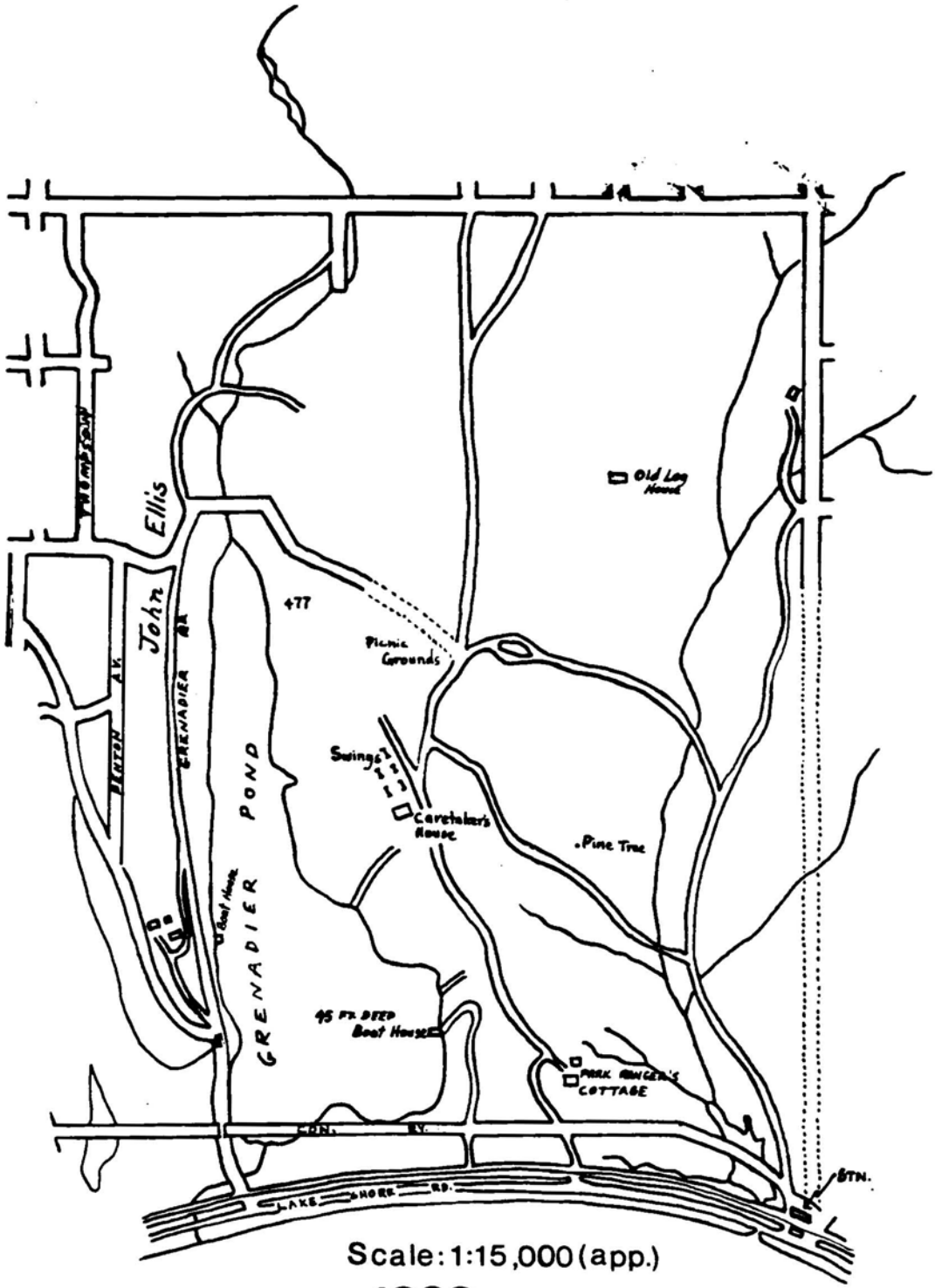
At the north end the marsh is very much the same in size as in 1969. Hillside trails north of the boathouse also seem about the same in size and number.

1976

At the present time the northern marsh seems to be slightly smaller again than in 1972 but otherwise few changes have been recently made. In summary, it appears that in the past 29 years the marsh remaining in the south has been reduced slightly in size; the northern one has been reduced in area by at least 300%; other areas of natural shoreline with or without wide borders of marsh have been eliminated entirely; and, the surface area of the pond has been reduced by over 11 acres.

Part of the flow of the outlet of Grenadier Pond which flows under the streets is diverted to a catch basin from which it is pumped to a water reservoir in the Stelco plant along the Queensway. This water is used for cooling in the plant and when required is used at a rate of 450 gallons per minute (personal conversation, Stelco engineer). The engineering department may open a valve in the weir at the outlet of the pond if the water level drops too low. Stelco engineer (personal conversation) report that it has not been necessary to open this valve since they began using this water.

In 1937 a roadway was proposed along the west shore of Grenadier Pond (City Council Archives, 1937) and fill was put in at the southwest shore. A house at 75 Ellis Avenue is now on this site and the resident reports (personal conversation) that filling was not continued further along the shore because the bottom dropped off too quickly.



Scale: 1:15,000 (app.)

1888

MAP 13

3. WATER FLOW IN GRENADIER POND

Water flows into the pond from the creek at the north end and from an outlet of Catfish Pond at the marsh in the south west corner of the pond. Two streams flowing through the hillside rock gardens on the east bank also empty into the pond at a rate of 0.5 cfs. However this water is pumped from the pond and then passed through the rock garden back into the pond. Such water is not an additional source from outside the pond.

Water flow rates from the summer of 1976 are in Table 1.

Water flow at the outlet is often affected by weeds and garbage that collect on a screen with the result that outflow is sometimes less than the total inflow rates. Inflow was calculated from the formula: Flow = width x average depth x length x speed x 0.9. Water flow over the weir at the outlet was calculated using the formula Flow = 3,367 x length of weir (ft.) x [height of water over weir(ft)] 1.5 cfs (Hynes, 1970). The average outflow for the summer was 1.9 cfs which is 0.6 cfs greater than the average total inflow. This can be accounted for by water which enters the pond from hillside drainage and possibly from springs in the pond.

4. THE BOTTOM OF GRENADIER POND

Contrary to rumors in the High Park Park area, Grenadier Pond is not bottomless. The pond was depth sounded using a Ferrograph echo sounder and a contour map was made of depths in 5 foot invervals (See Map 14, Page 18). Maximum depth is 20 feet, the mean depth is 9.1 feet and the surface area is 47.0 acres. The total volume was calculated to be 428.1 acre - feet. The pond is .75 miles long and .25 miles wide with a perimeter of 1.94 miles.

The bottom of the pond was sampled at 18 stations using an Ekman dredge as marked over the contour map (See Map 14, Page 18). The soil types were recorded according to the soil type criteria in

the appendix See Appendix 8). The bottom was found to consist of the following soil types:

1) Silt: -found at all stations except areas within 30 feet of shore
-silt makes up 100% of bottom composition in the central part of the pond

2) Gravel: -found along the entire east and south shore out to 10 feet from shore
-it was put in by park workers in the early 1950's as a project by Park Commissioner Bell.

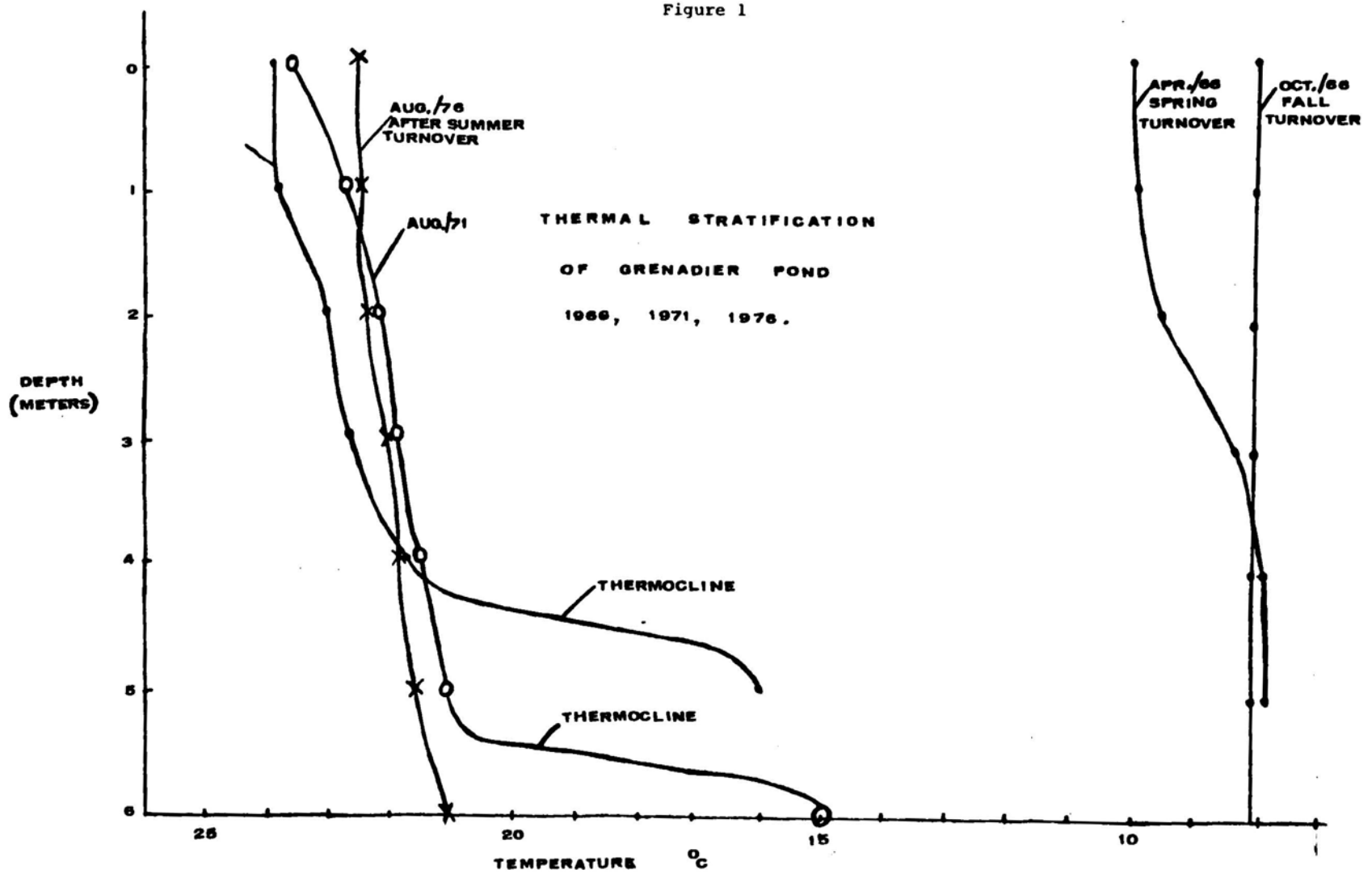
3) Boulder: -found mixed with gravel along the east and south shore
-it makes up 20% to 50% of the bottom in this area, the remainder being gravel.

4) Sand: -found at stations 2 and 4 (see Map 14 Page18) also found on the west shore in the area marked on the map.

5) Detritus: -found in all the marshy areas including station 3, 6, 12, 15, 16 and 21
-it makes up about 80% of the bottom along the west shore and almost 100% in the marshy areas.

The silt found at the south end was found to be lighter than the silt in the rest of the pond. It is this part of the pond which is noted for its quicksand bottom and it is here that a bulldozer was reported to be lost at the time fill was put in for The Queensway.

Figure 1


AUG./76
AFTER SUMMER
TURNOVER
AUG./71
THERMAL STRATIFICATION
OF GRENADIER POND
1966, 1971, 1976.
APR./66
SPRING
TURNOVER
OCT./66
FALL
TURNOVER
THERMOCLINE
THERMOCLINE
DEPTH
(METERS)
0
1
2
3
4
5
6
25
20
15
10
TEMPERATURE °C

WATER QUALITY STUDIES

MATERIALS & METHODS

Water chemistry tests were done weekly throughout the summer of 1975 at 5 stations as marked on the Chemistry Map 21. Water samples were taken from the surface at the inlet (Station 3), the outlet (Station 4) and the inlet from Catfish Pond (Station 5). At stations 1 and 2, a Kemmerer bottle was used to collect water samples at depths between 1 and 5 meters. Tests were always done between 10:00 a.m. and 2:00 p.m. so that O_2 and CO_2 values which vary with time of day could be compared. Water temperature was measured at all stations using a marine thermometer, hydrolab model FT-3M. Secchi discs readings were also taken at stations 1 and 2 to measure water transparency.

Using a Hach Chemical Kit, Model DR-EL, water at each station was analyzed for dissolved oxygen, pH, total hardness, alkalinity, copper and iron. Silica, nitrate and chloride were also tested for, then the proper chemicals were available. One water sample from station 1 was also analyzed at the Sports Fishery Lab in the Whitney Block, Parliament Buildings, Queen's Park Crescent, for conductivity so that the total dissolved solids could be calculated. Coliform counts were made at the surface waters at stations 1, 2 and 3. Disposable agar plates (supplied by Dr. Andrews from the University of Toronto) were exposed to the water for 30 seconds and coliform counts were made after incubation for 24 hours at $35^{\circ}C$.

Water chemistry data was also provided by the Ministry of Natural Resources from a lake survey of Grenadier Pond in 1971 and by Dr. Rigler from the University of Toronto from work done in 1966. Dr. Andrews from the University of Toronto also supplied data from tests made in the summer of 1976. Measurements of primary productivity were also provided by Dr. Rigler from graduate studies done in 1964.

The results of water quality tests on Grenadier Pond appear in Table 3. These tests were performed at 5 stations on a weekly basis so that any changes could be detected and so that comparison could be made between different areas of the pond. Station 1 is at the deepest part of the pond when chemical and thermal stratification should occur. Station 2 is characteristic of the north part of the pond. Station 3 is an inlet with water supplied by a creek coming from under Bloor St. Station 4 is the only outlet and is characteristic of surface water at the south part of the pond. Station 5 is an inlet from Catfish pond which is to the west of Grenadier Pond.

TEMPERATURE

Grenadier Pond warms up quite quickly in the summer as it is relatively shallow with a maximum depth of 20 feet (6.5 meters) and a mean depth of 9 feet (3 meters). In June and early July the pond was stratified as is typical for lakes in summer, with warm surface water, a thermocline at a depth of 4 meters and cold water in the hypolimnion. However the thermocline was gone by mid July and the pond was almost the same temperature from surface to bottom. This is indicated on the temperature graph on which temperatures from August 1976 are compared with those of previous years. From water quality data it can be seen that the pond lost its stratification between July 5 and July 13. On July 11 it was observed that the pond was quite black in colour with high waves and there was a very strong wind from the north. This was probably the day that the pond "turned over".

The lake survey by the Ministry of Natural Resources in August 1971 indicates that the pond was stratified with a thermocline at 16 feet (5 meters) (See graph). Dr. Rigler's data from 1966 (see graph) also indicates that the pond remained stratified. However Dr. Rigler (personal conversation) reported that it is quite common for the pond to "turn over" in mid summer. This phenomenon is due mainly to strong winds which blow either from the north or south as the pond is unprotected by high banks at

Table 2

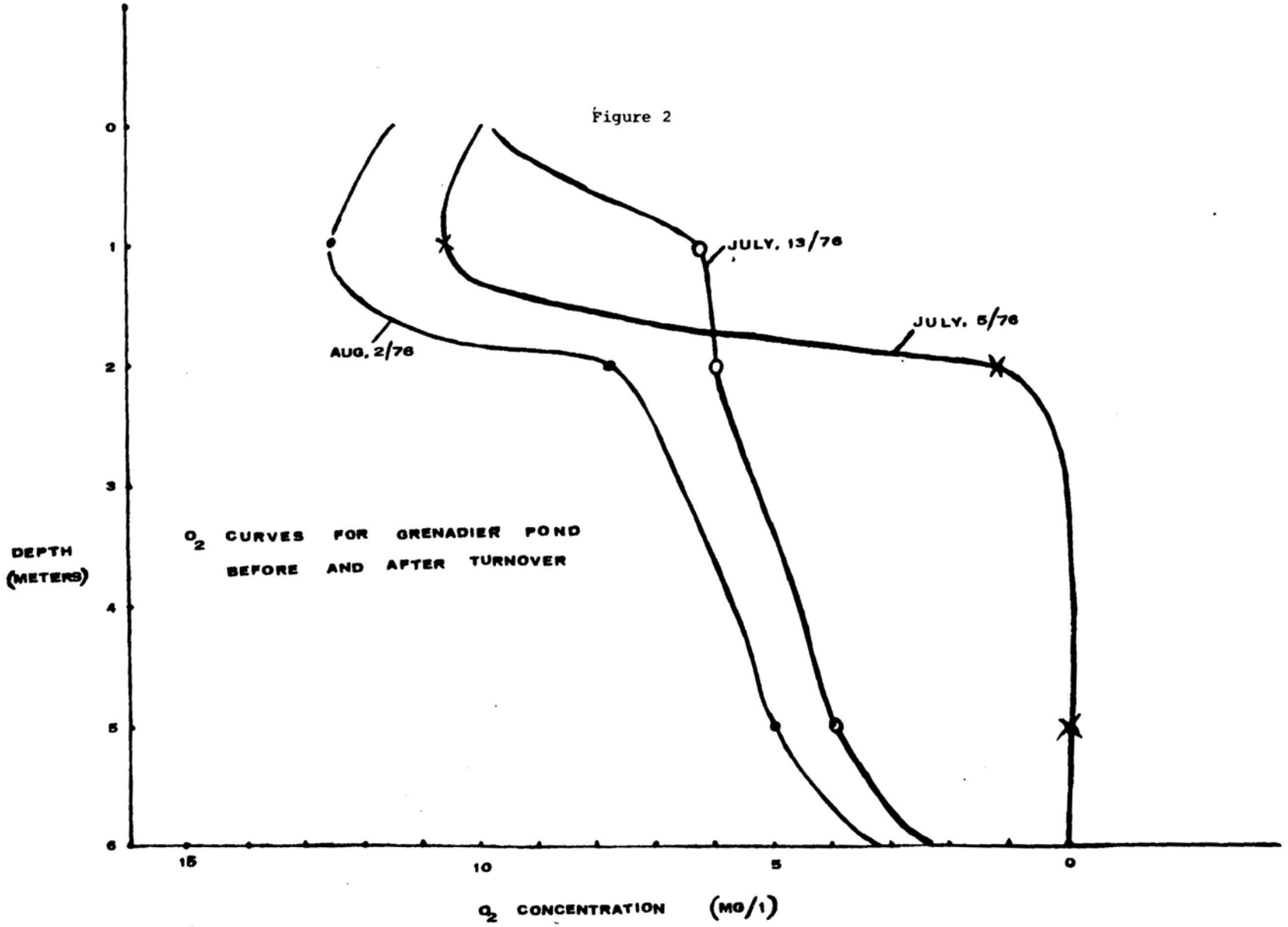
TEMPERATURES (^{o}C) OF GRENADIER POND 1966, BY DR. RIGLER, U of T

Depth (m)	Date → 16/4	22/4	2/5	20/5	5/6	13/6	20/6	28/6	4/7	11/7	19/7	25/7	2/8	15/8	7/9	14/9	19/10	3/11
0	10.0	12.0	10.6	15.5	21.4	21.1	24.2	28.1	29.8	25.9	25.7	26.2	23.9	23.9	21.4	18.5	11.1	8.2
0.5	9.7					21.1	23.8	27.9	30.3	25.8	25.7	26.2	23.8	23.6	21.4	18.5	11.1	8.1
1	9.7	11.8	10.5	15.0	21.1	21.1	23.2	28.0	29.3	25.8	25.7	26.3	23.9	23.1	21.4	18.3	11.1	8.1
1.5	9.2					21.1	23.2	27.8	29.3	25.8	25.7	24.9	23.8	23.1	21.3	18.2	11.1	8.1
2	9.2	11.8	10.0	14.5	18.5	21.1	23.1	27.8	28.9	25.8	25.6	24.4	23.9	23.0	21.6	18.0	11.1	8.1
2.5	8.7					20.9	21.9	24.7	27.0	25.8	25.5	24.0	23.8	22.8	21.4	17.3	11.1	8.1
3	8.3	11.2	9.9	12.7	16.4	19.2	21.0	22.4	24.7	24.7	25.4	23.0	23.9	22.7	21.4	17.0	11.1	8.1
3.5	8.2					18.8	19.3		19.8					22.6			11.1	8.1
4	8.1	11.1	9.8	10.9	14.8					17.5	19.6	19.5	20.8	21.8	20.6	16.9	11.1	8.1
5	7.3	9.7	9.4	9.7						15.1	14.1		14.6	16.0	18.1	17.0	11.1	8.1

OXYGEN CONCENTRATIONS (O_2 IN mg/1) OF GRENADIER POND, 1966, BY DR. RIGLER, U of T

Depth (m)	Date → 28/6	4/7	11/7	19/7	25.7	8/8	15/8	7/9	14/9
0	10.99	8.95	7.46	8.17	10.12	7.95	9.32	6.89	8.68
1	10.70	8.95	7.32	8.11	10.27	7.73		6.84	9.61
2	6.75	7.20	7.24	7.96	6.36	7.74	8.58	6.82	9.82
2.5		2.33							
3	3.64	1.21	6.48	6.62	1.99	7.45	7.33	7.25	5.62
4			0.00	1.29	1.11	3.08	4.68	0.00	1.38
5				0.00		0.00	0.00	0.00	0.00

Figure 2


JULY. 13/76
JULY. 5/76
AUG. 2/76
O_2 CURVES FOR GRENADIER POND
BEFORE AND AFTER TURNOVER
DEPTH
(METERS)
0
1
2
3
4
5
6
15
10
5
0
O_2 CONCENTRATION (MG/1)

either the north or south ends. The graph also reveals the temperature during the spring and fall turnovers in 1966.

The summer temperature range of the inlet at the north end was 13.5°C to 18°C which is much colder than the surface water of the pond. This water which comes from under Bloor St. and cannot be traced to a definite source is probably fed by underwater springs.

The temperature of the inlet from Catfish Pond is always quite high in the summer as it is fed by surface waters of Catfish Pond and was found to vary from 21°C to 24.5°C. In the same way the outlet of Grenadier Pond is fed by surface waters and is always quite warm in the summer and had a temperature range from 22.5°C to 25°C.

DISSOLVED OXYGEN

Dissolved oxygen concentration in Grenadier Pond tended to be quite high near the surface and dropped off very quickly with depth to low concentrations at the bottom. Oxygen was influenced to a great deal by the thermal stratification. Before the lake "turned over" between July 5 and July 13, there was high oxygen concentration in the epilimnion (up to 12.7 mg/l) and no oxygen below the thermocline in the hypolimnion. This is due to the abundance of aquatic plants in the top 2 meters of water and the oxygen maximum at 1 meter on the graph indicates that this is probably the depth of greatest photosynthetic activity. The oxygen concentration in the surface water always exceeded the minimum of 5 mg/l. for warm water biota as is the criteria of the Ministry of the Environment (1974) in their Guidelines for Water Quality.

After the lake "turned over" the oxygen stratification was less marked and there was oxygen down to the bottom of the pond as seen in the O_2 curve for July 13 (see accompanying graph). The O_2 curve for August 2 illustrates the oxygen stratification after the pond had been "turned over" for 3 weeks and the oxygen

concentration had risen again in the upper part of the pond where the greatest photosynthetic activity occurs. Oxygen remained in the bottom of the pond because mixing could occur since there was no thermocline at this time.

Dr. Rigler (personal conversation) reported that fish kills have sometimes occurred in the summer when the pond "turned over" due to heavy south winds from the lake. This is a result of a drop in the oxygen concentration in the upper water when it is mixed with anoxic water from the bottom. However fish kills were not noticed in the summer of 1976 after a turnover. It can be seen in the O_2 curve for July 13 that the oxygen concentration was far above the critical level of 5 mg/l. for aquatic life.

The oxygen levels found in 1966 by Dr. Rigler and in 1971 by the Ministry of Natural Resources are similar to those found in 1976. However the hypolimnion remained anoxic in these years because the pond did not "turn over".

Oxygen concentrations varied to a great extent in the inlet from Bloor St., ranging from 0 to 5.8 mg/l. Usually oxygen was quite low in this creek which is quite likely due to a high chemical oxygen demand and a high biological oxygen demand. It was also noted that there are very few aquatic plants in the creek and thus there would be little oxygen supplied by photosynthesis. Because of the low oxygen levels in the creek there were no fish and few aquatic invertebrates.

The oxygen concentration in the inlet from Catfish Pond ranged from 1.0 to 6.0 mg/l. Oxygen levels were usually high enough to support aquatic life in this creek and fish fry and invertebrates were usually found here.

TOTAL HARDNESS, ALKALINITY, PH AND CARBON DIOXIDE

Hardness, alkalinity, pH and CO_2 are all very closely linked to one another in any body of water. The amount of free CO_2 can be critical as it controls pH, hardness, the effect of toxic materials and is one of the most important factors in determining the suitability of lakes for aquatic life.

Alkalinity which is a measure of carbonate, bicarbonate and hydroxide, determines the basicity or acid binding capacity of the water (Hutchinson 1957). The Ministry of the Environment's guidelines for the protection of aquatic life (1974) require that alkalinity be greater than 20 mg/l. Throughout the summer the alkalinity in Grenadier Pond was between 160 and 410 mg/l. which is quite high and is quite suitable for aquatic life. Hardness which is a measure of calcium carbonate is also quite high in Grenadier Pond and was found to vary from 260 to 320 mg/l. during the summer. Because the water is quite hard and has a high alkalinity, it has a good buffering capacity against any toxic chemicals that might get into the water.

It is also important in water bodies that free CO_2 be present in equlibrium with calcium bicarbonate. The pH is determined by the relation between CO_2 and carbonate due to hydroxide ions arising from hydrolysis of bicarbonate and hydrogen ions from the dissociation of carbonic acid (Ruttner, 1971). Thus the presence of CO_2 helps to maintain an equilibrium in the buffering capacity of a water body. CO_2 which was measured by Dr. Andrews during the summer was found to be in the range of 7.5 to 10 mg/l. This is well within the maximum limit of 25 mg/l set by the Ministry of the Environment (1974). The pH was found to vary between 7.0 and 8.6 during the summer, a range that is suitable for aquatic life. The water quality criteria of the Ministry of the Environment (1974) requires that pH be within a range of 6.5 to 8.5 to protect aquatic life.

WATER CHEMISTRY DATA FOR GRENADIER POND - 1976 Table 3

Date	Station	(m) Depth	mg/l O_2	pH	mg/l Alkalinity	mg/l Hardness	mg/l N_2	mg/l Fe	mg/l Cu	mg/l Si	mg/l Cl	°C Temperature	Coliform
3/6/76	1	0										24.5	
		1										24.0	
		2	9.6	7.8	270	300	0	0	.2			22.5	
		3	2.2									22.0	
		4										21.0	
		5	0	7.1	390	300	.3	.2	.1			15.0	
		6										13.0	
	2	0										25.0	
		1	9.4	8.4	270	300	.1	0	.3			25.0	
		2										24.5	
9/6/76	1	0										24.0	
		1										23.5	
		2	9.2	8.0			.3					22.5	
		3										21.5	
		4	1.4	7.4								16.5	
		5	0	7.4								14.5	

Cont'd

WATER CHEMISTRY DATA FOR GRENADIER POND - 1976 Table 3 cont'd

Date	Station	(m) Depth	mg/l O_2	pH	mg/l Alkalinity	mg/l Hardness	mg/l N_2	mg/l Fe	mg/l Cu	mg/l Si	mg/l Cl	°C Temperature	Coliform
	1	6										13.5	
	3	0	5.8	7.2	660	660	.5	.9	.4				
	4	0	8.2	8.0	310	320	.2	.2	.3				
11/6/76	5	0	2.0	7.0	400	220	3.3	.1					
15/6/76	1	0										24.0	
		1	12.2	8.2	300	300	.3	.1	.3			24.0	
		2										23.0	
		3	2.8	7.4	340	290	.2	.1	.3			22.0	
		4										19.5	
		5	0	7.4	410	320	.5	.2	.2			14.5	
		6										13.5	
21/6/76	3	0	4.6	7.5	750	570	1.7	.7	.2			18.0	
	4	0	9.0	7.7	800	300	.2	.1	.2			24.5	
	5	0	6.0	7.4	450	270	0	.3	.1			23.5	
29/6/76	1	0										25.0	
		1										24.5	

Cont'd

WATER CHEMISTRY DATA FOR GRENADIER POND - 1976 Table 3 cont'd

Date	Station	(m) Depth	mg/l O_2	pH	mg/l Alkalinity	mg/l Hardness	mg/l N_2	mg/l Fe	mg/l Cu	mg/l Si	mg/l Cl	°C Temperature	Coliform
		2	10.2	8.5	340	290	.1	.2	.3	3.0		24.0	
		3										23.5	
		4										21.0	
		5		7.2								15.5	
		6		7.2								13.0	
	2	0										25.0	
		1	8.0	8.0	370	300	.2	.1	.3	2.4		24.5	
		2										23.0	
	3	0	2.6	7.3	730	550	.2	.6	.2	2.5		16.0	
	4	0	7.2	7.6	700	300	.2	.2	.3	1.7		25.0	
	5	0	1.2	7.4	410	230	0	.2	.1	0		24.5	
5/7/76	1	0										24.0	
		1	10.6									23.0	
		2	1.2	7.2	200	300	.2	.1	.2	2.3		22.3	
		3										21.5	
		4										21.0	
		5	0									16.0	

Cont'd

WATER CHEMISTRY DATA FOR GRENADIER POND - 1976 Table 3 cont'd

Date	Station	(m) Depth	mg/l O_2	pH	mg/l Alkalinity	mg/l Hardness	mg/l N_2	mg/l Fe	mg/l Cu	mg/l Si	mg/l Cl	°C Temperature	Coliform
		6										13.5	
	2	0										25.0	
		1	6.6	7.8	160	260	.2	0	.2	3.0		25.0	
		2										24.0	
	3	0	0	7.0	400	600	.1	.5	.5	5.0		17.0	
	4	0	1.6	6.3	160	270	.2	.1	.2	2.5		25.0	
	5	0	1.0	6.8	240	230	0	.2	.1	1.7		24.0	
13/7/76	1	0										22.0	
		1										21.5	
		2	6.0	7.3	170	300	.3	0	.2	4.0		21.5	
		3										21.5	
		4										21.5	
		5	4.0	7.6								21.2	
		6										14.0	
	3	0	0.6	7.4	400	540	.5	.8	.2	2.5		14.5	
	4	0	9.8	7.8	170	300	.3	.1	.2	2.5		23.0	

Cont'd

WATER CHEMISTRY DATA FOR GRENADIER POND - 1976 Table 3 cont'd

Date	Station	(m) Depth	mg/l O_2	pH	mg/l Alkalinity	mg/l Hardness	mg/l N_2	mg/l Fe	mg/l Cu	mg/l Si	mg/l Cl	°C Temperature	Coliform
25/7/76	2	0										23.3	
		1	8.2	7.7	168		.1	.2	.4	1.9		23.1	
		2										22.4	
	3	0	1.2	7.3	400		.4	.6	.2	3.0		13.5	
	4	0	6.4	7.6	180		.2	0	.2	3.5		22.5	
	5	0	5.6	7.6	270		0	.3	.6	3.5		21.0	
	1	0										23.0	
		1										22.6	
		2	4.6	8.6								22.5	
		3										22.4	
		4										22.1	
		5	2.8	7.1	170		0	0	.2	2.5		22.0	
		6										20.0	
2/8/76	1	0										23.0	105
		1										22.5	
		2	7.8	8.6								22.2	
		3										22.0	

Cont'

WATER CHEMISTRY DATA FOR GRENADIER POND - 1976 Table 3 cont'd

Date	Station	(m) Depth	mg/l O_2	pH	mg/l Alkalinity	mg/l Hardness	mg/l N_2	mg/l Fe	mg/l Cu	mg/l Si	mg/l Cl	°C Temperature	Coliform
	2	0										21.0	
		1	5.6	7.4	151	300	.5	.1	.4	4.0		21.0	
	2											21.0	
	5	0	1.0	7.2	270	250	.2	.2	.4	2.5		22.0	
19/7/76	1	0										23.0	
		1										23.0	
		2	7.4	8.2								22.7	
		3										22.0	
		4										21.7	
		5	2.8	7.2	160		.2	0	.2	1.9		21.5	
	2	0										24.0	
		1	3.4	7.9	160	300	.3	.1	.3	3.5		23.5	
		2	4.6									22.5	
	3	0	3.6	7.3	370		.4	.6	.3	3.0		17.5	
	4	0	3.4	8.4	160		.2	0	.2	3.0		23.5	
	5	0	1.2	6.8	270		0	.4	.5	3.0		22.5	

Cont'd

WATER CHEMISTRY DATA FOR GRENADIER POND - 1976 Table 3 cont'd

Date	Station	(m) Depth	mg/l O_2	pH	mg/l Alkalinity	mg/l Hardness	mg/l N_2	mg/l Fe	mg/l Cu	mg/l Si	mg/l Cl	°C Temperature	Coliform
		2										22.5	
	3	0	1.4	7.0	370			.5	.1	2.1	350	16.5	
	4	0	4.4	7.1	150			.1	.1	2.8	360	23.5	
	5	0	2.6	8.0	150			.2	.1	.7	380	22.8	

WATER CHEMISTRY DATA FOR GRENADIER POND - 1976 Tab;e 3 cont'd

Date	Station	(m) Depth	mg/l O_2	pH	mg/l Alkalinity	mg/l Hardness	mg/l N_2	mg/l Fe	mg/l Cu	mg/l Si	mg/l Cl	°C Temperature	Coliform
		4										21.9	
		5	5.0	7.0	160			.1	.1	4.0		21.8	
		6										21.1	
	2	0										23.0	38
		1	12.6	8.7	160			.1	.1	4.0		22.8	
		2										22.4	
	3	0	2.4	7.2	370			.45	.2	3.0		18.0	100
	4	0	9.4	7.8	140			.1	.1	4.0		22.5	
	5	0	4.2	7.8	250			.1	.2	.2		21.0	
11/8/76	1	0										22.6	
		1										22.5	
		2		8.4								22.4	
	1	3										22.0	
		4										21.8	
		5	1.0	7.1	160			.1	.1	2.2	350	21.5	
		6										21.0	
	2	0										22.5	
		1		7.1	140				.2	2.5	350	22.5	

Cont'd

NITROGEN AND PHOSPHOROUS

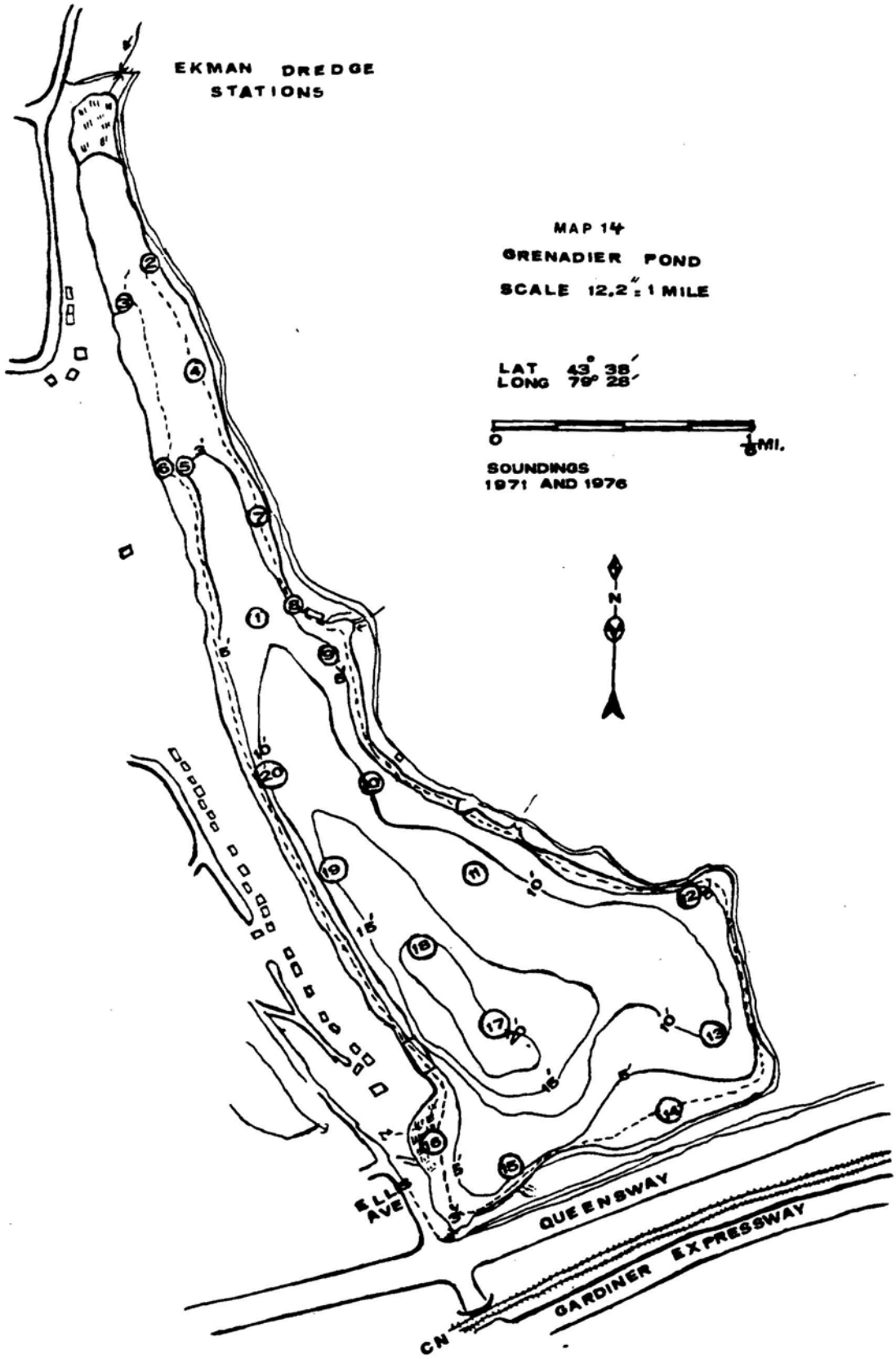
Nitrogen and phosphorous are two nutrients necessary for plant growth. Nitrate levels were low in Grenadier Pond with values ranging from 0 to .5 mg/l. Dr. Andrews also found that ammonia levels were quite low (.3 mg/l) when he measured them during the summer. Dr. Andrews also measured phosphate at 1.2 mg/l. in the pond. This is quite high as a mean phosphorous content of .003 mg/l was found in Northern Wisconsin lakes in 1931 (Welch 1935) Thus it appears that nitrogen is the limiting nutrient for algae growth in Grenadier Pond.

TOTAL DISSOLVED SOLIDS

Total dissolved solids were measured once during the summer using a conductivity meter at the Sports Fishery Laboratory, Queen's Park. A reading of 1450 uhmos at 25°C was found which corresponds to 937 mg/l. of total dissolved solids. In 1971 the Ministry of Natural Resources found that the T D S was 983 mg/l. indicating that it has remained much the same. Greandier Pond is a eutrophic body of water and this value for T D S indicates that it is quite high in nutrients. Nutrients are supplied to the pond from the rich fertilized soil on the hillsides from which water is washed into the pond during heavy rain storms. The 2 inlets are also sources of nutrients to the pond. The hillside gardening foreman (personal conversation) reports that an average of 100, 80 lb. bags of fertilizer per year are used on the east hillside of the pond. The Water Encyclopedia sets a maximum limit of 2,000 mg/l. T D S for water used by aquatic life (Todd, 1970) and the levels found in Grenadier Pond were well within this limit.

CHLORIDE

Chloride ion was found to be in high concentrations in Grenadier Pond values of 350 mg/l. were found and Dr. Andrews measured chloride at 600 mg/l. These are quite high levels and could indicate that sewage is entering the pond as is reported by


EKMAN DREDGE STATIONS
MAP 14
GRENADIER POND
SCALE 12.2" : 1 MILE
LAT 43° 38'
LONG 79° 28'
0
1/8 MI.
SOUNDINGS
1971 AND 1976
N
ELLIS AVE
QUEENSWAY
GARDINER EXPRESSWAY
CN

local residents. Chloride could also enter the pond from the inlet at the north end which may be fed at times by drainage from the streets containing road salts.

IRON, COPPER AND SILICA

Iron was found in low levels in the pond, between 0 and .2 mg/l. with higher levels up to .8 mg/l. in the north inlet. Copper varied from .05 to .55 mg/l. during the summer and silica was found in concentrations of 1.7 to 4.0 mg/l. with lower levels down to .2 mg/l. in the inlet from Catfish Pond. Copper concentrations should be less than .02 mg/l. (Todd, 1970) for fresh water organisms and the levels in Grenadier Pond are quite high.

COLIFORM COUNTS

The Ministry of the Environment (1974) sets the limit for total body contact recreation of surface waters at 20 coliform bacteria /ml of water. In three tests it was found that the coliform counts at the surface of the pond were 38, 100 and 105. These are all higher than the levels acceptable for swimming. Although swimming is prohibited in Grenadier Pond people were observed swimming on several occasions during the summer.

TRANSPARENCY

The water in Grenadier Pond has a grey brown colour. Secchi disc readings were found slightly less than 1 meter. The secchi disc readings dropped to .7 meters when there were strong winds as soil particles would become suspended in the water. Many landowners on the west side of the pond also complained that the pond had a strong odor at the north end.

PRIMARY PRODUCTIVITY

Arthur Randall made measurements of the productivity of Grenadier Pond for graduate studies at the University of Toronto in 1974. He found that Grenadier Pond was highly productive from early to late fall. The net productivity using the O_2 in Situ Method was found to be 2.62 mg O_2 /l /Hr which is very high compared to Northern Ontario lakes which have rates of productivity in the order of .05 mg O_2 /l /hr. (Randall, 1974).

FLORAL INVENTORY

METHODS

Since records dating as far back as the late 1800's were available on plants present in the park, and since one of the prime objectives of this study was to examine the effects of urbanization and development on the flora of the park, a herbarium search was undertaken to determine the history of the park flora. This involved checking the University of Toronto's herbarium collection of approximately 190,000 plants to make a list of more than 340 species of plants found in High Park during the last 90 years. Time did not permit the verification of all these specimens but dubious or otherwise interesting records for the park, and those with difficult taxonomy were verified, often with the help of experts at the University of Toronto, Botany Department. This plant list provided a baseline for further work.

Sight records, those without an accompanying herbarium specimen compiled by various naturalists over the years, (the most comphrehensive list of sight records is the Checklist of the plants of Four Toronto Parks, by the Toronto Field Naturalists Botany Group) were checked. Since the area studied was in a park where many floral elements are preserved we were able to walk through the park and identify in the field the presence of many species, without having to collect them. With the added assistance of local naturalists, notably Miss Emily Hamilton, and Mr. Paul Catling, a complete field list was made for comparison with the sight record list. Only plants which were unidentifiable in the field (e.g. grasses, sedges, and some aquatics,) or those which represented a new record for the park and so required specimen evidence, were collected. These specimens are now located at the University of Toronto herbarium.

One of the most common methods of surveying vegetation is the quadrat or transect method which requires undisturbed habitat. For various reasons, this method was not used here. In the first place, this method would have taken up valuable time which was put to better use

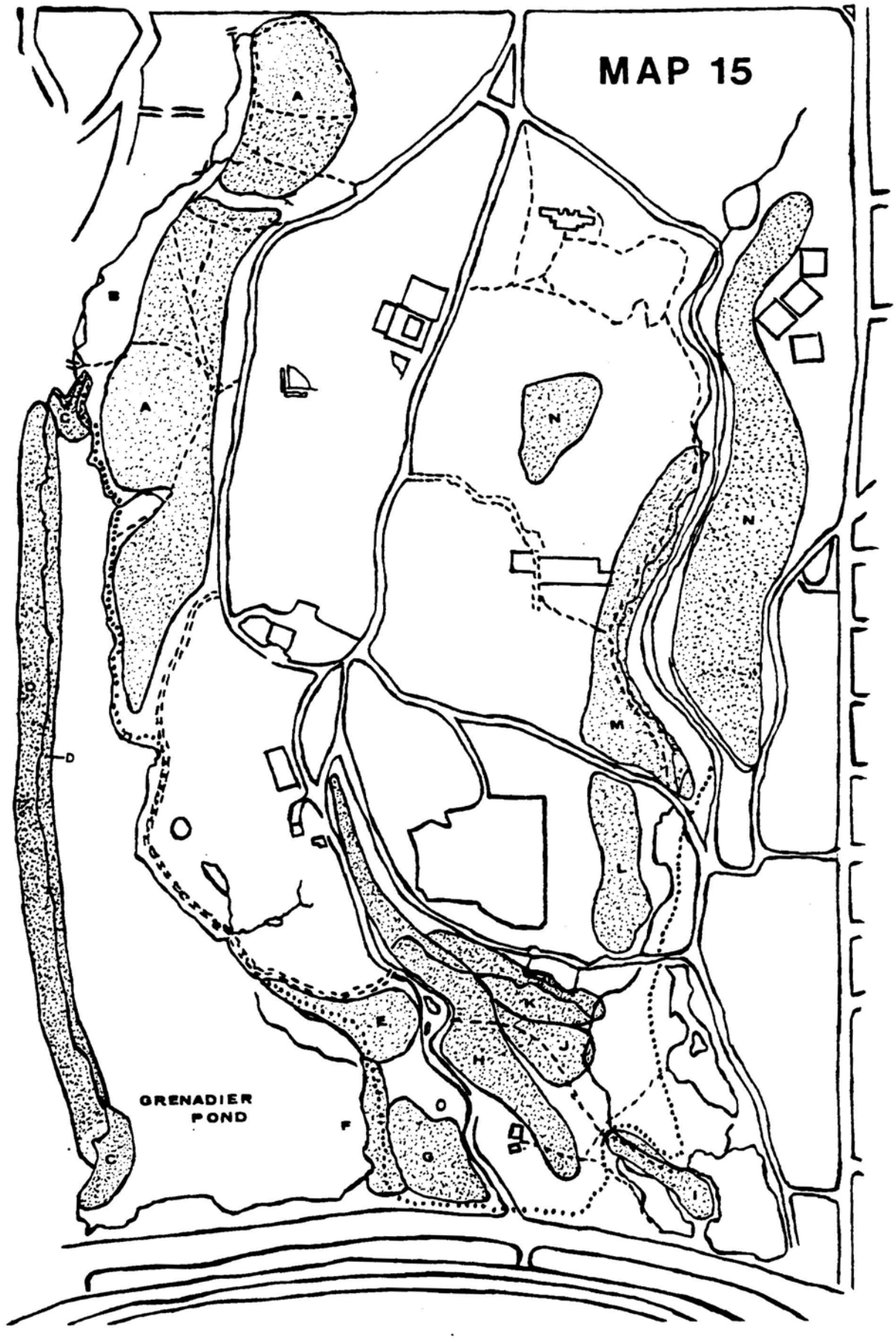
obtaining a history of the flora. Secondly, being in a city park, these natural areas are heavily used by humans with paths criss-crossing everywhere and so there would be no uniformly undisturbed habitat anywhere. Hence a visual method of assessing the various habitats throughout the park was used instead.

This study was commenced in late May. Consequently most of the spring flowers (Violets, Trilliums etc.) were past flowering when field trips were made. It is unknown therefore whether spring plants previously recorded in the park are still present. Similarly, many of the fall-flowering plants may have been missed. Forays next year hopefully will fill in the gaps and produce a completely updated checklist of the vascular plants of High Park.

The annotated checklist that follows indicates the abundance and habitat of each species and particular feature that makes it unique or interesting.

Following the checklist is a discussion of various biologically sensitive areas within the park, with particular references to description of the habitat, unusual species present, man's interference with these areas and recommendations for their future management. All areas are referred to by letter, and are mapped on a small map of the whole park, and in more detail on eight maps of sections of the park, with exact locations of unusual species.

All names used for plants are those found in Gleason and Cronquist's A Manual of Vascular Plants reference no. 9. Sequence of plant species used in the checklist is according to Dalle Torre's system of vascular plant arrangement, and corresponds to the order used in the University of Toronto herbarium.


MAP 15
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AREA A

The hillside on the east side of Wendigo Ravine and north of Grenadier Pond is perhaps the area that makes High Park truly unique.

The slope of the hill has allowed nutrients in the sandy soil to be leached out by the rainfall and leave the upper layers of soil slightly acidic. The oak forest which dominates this slope contributes to the acidity of the soil; the oak leaves decay in the autumn releasing tannic acid into the soil. This resultant dry acid sandy soil found here, provides an environment which is conducive to the growth of unusual plants. This type of soil is more common towards southwestern Ontario; hence many plants found here tend to be southern or western in their affinities.

Oaks provide the main canopy on this hillside. Red Oak (Quercus borealis) is the dominant species, but the White Oak (Quercus alba) and the more southern Black Oak (Quercus velutina) are also abundant. Black Cherry (Prunus serotina) is scattered throughout the area, and one Red Pine (Pinus resinosa) may be found. Here and there clumps of Sassafras (Sassafras albidum) are found growing. This tree is at the northern limits of its distribution in Ontario, here, and was one of eleven species used by Soper to determine the limits of the Carolinean Zone in southern Ontario (Soper, 1962).

The open nature of the forest canopy has allowed the understory, particularly the herbaceous layer, to become extremely diverse. The herb layer is prolific throughout the spring, summer and fall, since growth is not restricted to early spring, the only time in most forests when sufficient light reaches the ground level. In addition, the soil is generally too dry for most shrubs, so that there is no competition for light with a dense shrubby layer. Shrubs that exist in this habitat are small, generally not more than three feet in height, and are particularly adapted to dry sandy soil.

Juneberries (Amelanchier sanguinea and Amelanchier spicata var. stolonifera) are both found here, often in association with Low Sweet Blueberry (Vaccinium angustifolium), and a more southern species Vaccinium pallidum. This particular species, often referred to in the past as Vaccinium vacillans, extends south as far as Georgia and is only known from about five locations in Canada, all of them in southern Ontario. Of these, High Park represents a major stand, and likely the only protected one. This unusual blueberry occurs only on the west side of the park, and is replaced by Vaccinium myrtilloides, the Velvetleaf Blueberry on the eastern side of the park. Occurring with the Blueberries and Juneberries is the Huckleberry (Gaylussacia baccata), another unusual plant in York County. All these species prefer dry sandy soil, which is rather rare in the Toronto region.

These shrubs form patches here and there in the clearings between trees along with Bracken Fern (Pteridium aquilinum) which is widespread throughout this area, and New Jersey Tea (Ceanothus americanus), which is somewhat less common. Here and there, patches of Sweet Fern (Myrica asplenifolia) intermingle with the Bracken Fern and the Blueberries. Sweet Fern is not a fern at all, but a member of the Myricaceae, and is very unusual in the Toronto area.

Unfortunately, in many of these low areas of interesting shrubbery and other plant associations, introduced Cherry trees as well as young Sassafras albidum and Quercus borealis are growing up in dense stands, threatening to shade out the interesting vegetation beneath them. These saplings should be removed, either by selective cutting or by burning in early spring or late fall, when no harm to the herb layer would be done.

The herbaceous plants that grow in this open oak woodland are just as unique and are tremendously diverse. Many of the species have western affinities, a few are at the northern limits of their distribution, and all are adapted to a dry sandy soil characteristic of this hillside. Perhaps the most spectacular of these plants is the Wild Lupine, (Lupinus perennis). At one time this plant covered

the hillsides of this portion of High Park so thickly that the hills were described as 'blue with Lupines'. Unfortunately their numbers have been drastically reduced through destruction of their habitat when the hillside gardens were constructed, and through weed-killers; now only scattered plants remain, usually located on the outer fringes of the colonies of shrubs.

Further towards the open areas of the hillside, many other unusual plants are found. Frostweed (Helianthemum canadense) and Pinweed (Lechea intermedia) are found here and there, often associating with Harebells (Campanula rotundifolia, Campanula rapunculoides), Field Bindweed (Convolvulus arvensis), Hedge Bindweed (Convolvulus sepium), and Upright Bindweed (Convolvulus spithameus), which is the rarest of the three species. The grasses in this area consist mainly of Festuca ovina, Festuca rubra, the native species, and Andropogon scoparius. In amongst the hummocks of Fescue Grass can be found the Northern Downy Violet (Viola fimbriatula) as well as the Carolina Rose (Rosa carolina), which is at the northern limits of distribution in Ontario, and Liatris cylindracea, the Blazing Star, which is at its eastward limit in Ontario at this location.

Rarer and more local are the Prairie grasses. These grasses do not become evident until late summer when they shoot up to heights of four feet or more and produce their inflorescences. More common in remnants of the Tall Grass Prairie in extreme southwestern Ontario, both Turkey-foot (Andropogon gerardi) and Indian Grass Sorghastrum nutans) occur in the open oak woodland, frequently accompanied by Hairy Bush-Clover (Lespedezea capitata) and the common Round-headed Bush-Clover (Lespedezea hirta).

Along with the late flowering prairie grasses come most of the members of the Asteraceae. Sunflowers make their appearance first, with Helianthus divaricatus, the Woodland Sunflower coming into bloom in mid July, followed later by the Ten-petalled Sunflower (Helianthus decapetalus). The Early Goldenrod (Solidago juncea) is next to appear, followed closely by the Heath Aster (Aster ericoides), Calico Aster (Aster lateriflorus), and scattered plants

of the Sky-blue Aster (Aster azureus). The Goldenrods present in this area of the park include: Early Goldenrod (Solidago juncea), Gray Goldenrod (Solidago nemoralis), Hairy Goldenrod (Solidago bicolor var. concolor) and occasionally Canada Goldenrod (Solidago canadensis). Spring flowers were not seen this year, but likely contained a number of Dry-ground Violets as well as Starry False Solomon's Seal (Smilacina stellata).

It is readily apparent that this area of open oak woodland is extremely diverse in its flora. At one time most of the central portion of the park was probably similar to this. With the development of the park as a recreational resource, however, most of this has disappeared. The hillside gardens have taken up a large portion of prime habitat, and a toboggan run cutting through the center of the area has become a source of noxious weeds, which threaten to encroach on the more fragile natural vegetation. Every effort should be made to preserve this unique habitat, since it represents the last extensive open oak woodland in the Toronto region, and probably in York Region.

AREA B

Wendigo Way Ravine extends from Bloor Street to Grenadier Pond. On the east side of the stream is a steep slope, while the area to the west of the stream is a relatively flat and grassed playground area. In contrast to the open oak woods further up the east slope, the ravine itself, owing to the moister and probably more calareous nature of its soil, is densely thicketed with a rich variety of shrubs and a profusion of woodland plants.

The vegetation here is generally characteristic of many of the ravines to be found throughout Toronto. Red oaks (Querus borealis) are found here as well, but not in as great abundance, and they are joined by Sugar Maple (Acer saccharum), Beech (Fagus grandiflora) and Red Maple (Acer rubrum), Paper Birch (Betula papyrifera) and a

few trees of Yellow Birch (Betula lutea). Underneath this canopy are numerous shrubs: Beaked Hazel (Corylus cornuta), Round-leaved Dogwood (Cornus rugosa), Red Osier (Cornus stolonifera), Viburnums (Viburnum acerifolium and Viburnum lentago) and Honeysuckles, both native and introduced (Lonicera dioica, Lonicera canadensis, and Lonicera tatarica).

On the west bank of the stream is an impressive stand of Chokecherry (Prunus virginiana). Trailing over many of these shrubs is the Wild Grape (Vitis riparia) and the Virginia Creeper (Parthenocissus quinquefolia). All of these species provide good cover as well as excellent food for the many birds that inhabit this area. On the ground underneath this shrub layer are a number of woodland species. False Soloman's Seal (Smilacina racemosa), Trilliums (Trillium grandiflorum and Trillium erectum), and Wild Lily-of-the-Valley (Maianthemum canadense) are all abundant. Scattered throughout the area can be found plants of False Spikenard (Aralia racemosa) and Early Meadow-rue (Thalictrum dioica). And of course, Poison Ivy (Rhus radicans) is abundant everywhere throughout the area.

As one progresses down the east slope towards the stream and the path which runs along it, introduced species of plants begin to predominate. Great Hairy Willow-herb (Epilobium hirsutum) occupies extensive patches, while in a wet seepage area close to the stream bank there ia a large colony of the Small-flowered Forget-Me-Not (Myosotis laxa) and near by, a number of plants of Gill-over-the-ground (Glecoma hederacea). Under the Viburnums and Alders (Alnus rugosa) along the stream, exist hundreds of plants of the introduced Helleborine orchid (Epipactis helleborine), now the only orchid left in the park. Field Horsetail (Equietum arvense) and the Scouring Rush (Equisetum hyemale var. pseudohyemale) are widespread in these areas as well.

On the west side of the stream two garden escapes vie for dominance south of the Chokecherry stands; the Himilayan Balsam (Impatiens glandulifera) which occurs in slightly disturbed habitats throughout the park, and the Japanese Knotweed (Polygonum cuspidatum) which is

equally abundant. These two species are crowding out the habitat for the native Spotted Touch-me-not (Impatiens capensis) and the more rare Yellow Jewelweed (Impatiens pallida).

Other, more unusual species occur along the stream bank as well. The only plant of the Rough-leaved Goldenrod (Solidago patula) known in the park is to be found growing in moist soil along the east bank of the stream. Witch-hazel (Hamamelis virginiana) is found occasionally on the east slope, and in wet seepy areas near the stream can be found two sedges Carex laevivaginata and Carex hystericina.

Cans bottles, scrap metal and garbage litters the stream, and the flow rate in the stream is very low. The debris in the stream should be cleaned up. Otherwide the ravine should be left entirely alone. Although it does not contain any plant or habitat that is unusual, it does provide an excellent habitat for many species of birds, and it is one of the few areas in the park where the American Toad (Bufos americanus), once so plentiful in High Park, has been found.

Area C

At one time, Grenadier Pond had an extensive marshy shoreline. However over the years this marsh has gradually been reduced in its extent until only two areas of significance exist: one at the extreme north end of the pond and another at the south-west corner of the pond. These marshy areas are not large and in a heavily used park such as this one, they suffer considerable damage from children pulling out the cat-tails and from the trampling down of many paths crisscrossing the marsh. Although the marsh does not contain any unusual species, it does contain species that are found nowhere else in the park, and those which are not found within the city limits. It is, in addition to its botanical interest, an important wildlife area.

The dominant plant in these marshes is the Broad-leaved Cat-tail (Typha latifolia) with dense patches of Purple Loosestrife (Lythrum salicaria) and European Water-Horehound (Lycopus europaeus) growing along the edges by the water. Further south, the marsh opens out onto a mud flat area where numerous plants grow. Notable are four species of Bulrush (Scirpus acutus, Scirpus americanus, Scirpus atrovirens var. georgianus and Scirpus rubrotincus. Toad-rush (Juncus bufonius) is abundant on these mudflats. At the junction of the marsh and mudflat area, one clump of Juncus effusus, the Soft Rush, was discovered. This is rather an unusual species, much more common further north, and only two other locations in the York, Halton, and Peel Counties are known for this species. Only two plants of the Flowering Rush (Butomus umbellatus) were found this year, one plant in the north end marsh and one in the marsh at the southwest corner of the pond. However only 10 years ago hundreds of plants lined the shores of Grenadier Pond. (fide F.M. Catling).

The marsh at the southwest corner of the pond is similar in many respects to the north end marsh, with the exception that Bulblet-bearing Water Hemlock (Cicuta bulbifera) has been reported from here, although it is not known whether it still remains.

Herbarium records show that many unusual marsh plants were once collected from High Park, but have long since disappeared with the decimation of the marshes, particularly along the east shore of the pond. Unusual plants include Sessile-fruited Arrowhead (Sagittaria rigida), Marsh St. John's-wort (Triadenum virginicum) and Swamp Lousewort (Pedicularis lanceolata).

An interesting reference to Pitcher Plant (Sarracenia purpurea) is found in the diary of John Howard, who mentioned it as occurring along the east shore of Grenadier Pond, close to where the bay on the southeast corner occurs now. It is unlikely that this plant survived to the late 1890's or early twentieth century, since none of the early collectors who made rather comprehensive surveys of the area recorded or collected this plant. However

the plant was found nearby in the Humber Plains area, thus it is not unlikely that it was present in Grenadier Pond as well.

These marshes, in addition to their botanical interest, also provide good nesting and hiding places for birds such as the Red-wing Blackbird, Sora Rails, and Bitterns. Therefore it is very important that this area be maintained and efforts be made to encourage its growth. The pond at the north end is very shallow and by lowering the water level a few inches, a vast expanse of mudflats is exposed. This area is not only attractive to feeding birds, particularly shorebirds in migration, but also encourages the growth and spread of the Cat-tail marsh, thus rendering it less vulnerable to human destruction. The extant marshes also provide spawning areas for warmwater fish species.

AREA D

Area D consists of the land on the west slope of Grenadier Pond. The habitat is basically one of rich deciduous woodland, extending up a fairly steep slope to private property of residential houses at the top of the hill. In the middle section of this plot, the incline becomes more gentle, and the path which in most places, closely parallels the west shore, here curves away from the bank.

The most interesting vegetation on the west side of Grenadier Pond is to be found in this narrow strip of marshline vegetation. All along this bank, Sweet Flag (Acorus calamus) and Yellow Iris, (Iris pseudacoris), an introduced species, grow profusely, while here and there patches of Cat-tail (Typha latifolia) and the native Iris, Blue Flag (Iris versicolor) can be found. None of these plants are common in the park, and all have been drastically depleted with the dredging of the east shore of the pond and the subsequent destruction of most of the marshy shoreline in the park. At the extreme north end of the west bank, can be seen two or three plants of Wide-leaved Arrowhead (Sagittaria latifolia). There is only one other location in the park for this species, which was once abundant. On the water,

two species of Duckweed (Spirodela polyrhiza, and Lemna minor) can be found floating, and two feet north of a floating log are two plants of Water willow (Decodon verticillatus). This is the only location in the park for this species.

Close to this marshy shoreline runs the main pathway. At the north end, it runs through a 'Wildflower garden' in which unfortunately are found some plants which are not native to Canada, as well as rockery plants. Along the path are found a great variety of plants, all indicative of a rich woodland. These include the Lady Fern (Athyrium filix-femina) and the Sensitive Fern (Onoclea sensibilis) as well as a few specimens of Marsh Fern (Thelypteris palustris var. pubescens). Path Rush (Juncus tenuis) grows all along the edges of the path, occasionally joined by patches of Small-flowered Forget-me-not (Myosotis laxa) and the ever present Poison Ivy (Rhus radicans). Further south, where the path veers away from the shoreline, large stands of Purple Loosestrife (Lythrum salicaria), Great Hairy Willowherb (Epilobium hirsutum) and two species of Impatiens; Spotted Touch-me-not (Impatiens capensis) and the Himilayan Balsam (Impatiens glandulifera) can be found. Close to the water grows both the European and the American Water Horehound (Lycopus europaeus and Lycopus americanus respectively). Swamp Candles (Lysimachia terrestris) and Fringed Loosestrife (Lysimachia ciliata) are also found near to the shore.

To the west of the path, the area becomes one of a rich Oak-Maple forest. Red Oak (Quercus borealis) is dominant but there are abundant trees of White Oak (Quercus alba) Red Maple (Acer rubra) and Paper Birch (Betula papyrifera). Under this canopy are found many different shrubs. In the more open areas towards the south, Chokecherry (Prunus virginiana) Speckled Alder (Alnus rugosa), Beaked Hazelnut (Corylus cornuta), Round-leaved Dogwood (Cornus rugosa) and Red Osier Dogwood (Cornus stolonifera) were abundant with occasional shrubs of Common Elder (Sambucus canadensis) and various cultivated Honeysuckles (Lonicera sp.). At the extreme south end of this area, recent disturbances have changed the

character of the area, and many of the plants to be found here are introduced species or garden escapes. Large stands of Stinging Nettle (Urtica dioica) encroach on Red Raspberry (Rubus strigosus var. canadensis) and Wild Cucumber (Echinocystis lobata) trails overy many of the shrubs. In addition to the native trees, planted specimens of Scotch Pine (Pinus sylvestris), Black Willow (Salix nigra), and Black Locust (Robinia pseudo-acacia) can be found. At the extreme south end, near the Cat-tail marsh Matrimony Vine (Lycium halimifolium is located. This is a rather unusual escape from cultivation and is the only location in the park for this species.

This area is also an important area for birds. Dense cover, ample food sources and nesting sites attract great numbers of birds throughout the year. Canada Geese have nested in the marshy areas along the west bank and numerous ducks frequent the area. This area should not be disturbed. To preserve the almost completely wild environment that beautifies the west shoreline of Grenadier Pond the path should not be cleared up.

AREA E

In many ways, High Park offers continual surprises for the botanist. Although much of what was present in High Park has been destroyed, pockets of interesting vegetation remain, despite their proximity to heavily used recreational areas.

Area E is one such pocket. Basically, it consists of a U-shaped hillside opening to the west surrounding a flat area at the bottom which formerly was a bay of Grenadier Pond. At the base of this 'U' is a wooden stairway leading from Howard Road at the top of the hill to the pathway around Grenadier Pond at the bottom. Two feet from this stairway grows a plant which is very rare in Ontario and which represents the northern limit of its natural range in Ontario. Cup-plant, (Silphium perfoliatum) is a southern species extending to Georgia and Louisiana.

Soper considers this plant as one of eleven which occur exclusively within the Carolinean zone of Ontario and in fact uses its distribution in Ontario, including its presence in High Park as a means of determining the limits of the Carolinean zone (Soper, 1962). The only record of this plant north of High Park is from Simcoe County, but this is undoubtedly a cultivated specimen. Reports from naturalists have indicated that a considerable number of the plants were destroyed about ten years ago, and it is imperative that no further damage come to this colony of about twenty plants. No pesticides should be used anywhere near this hillside, and disturbance of the area should be kept to a minimum.

Other unusual plants occur on this hillside as well. On the north-facing slope, among Poison Ivy (Rhus radicans), and False Solomon's Seal (Smilacina racemosa), exists the only patch of Christmas Fern (Polystichum achrostichoides) to be found in the park. The north-facing slope faces a much harsher environment than does the south-facing slope - an environment which is conducive to the growth of this fern. Since it is located in the middle of a rather dense patch of Poison Ivy (Rhus radicans), it is likely to remain protected. However it will be in imminent danger if any attempts are made to exterminate Poison Ivy in this area. Further down the hill, there was found three plants of an unusual Polygonatum, Polygonatum commutatum or the giant Solomon's Seal, as it is sometimes referred to. This name is one given to a plant thought to be a tetraploid of Polygonatum pubescens or perhaps a hybrid between it and Polygonatum biflora. (Cruise and Haber, 1972). In any case, it is known only as a cultivated specimen in the counties of York, Halton and Peel, and certainly these plants are the most robust and impressive as any collected to date. Their presence, apparently growing without cultivation, represents an interesting record for this plant.

The north-facing hillside also contains two species of Desmodium, the Bush Tic-trefoil (Desmodium canadense) and the Woodland Tick-trefoil (Desmodium glutinosum), both interesting native plants of dry sandy soil. Desmodium canadense, in particular is extremely prolific throughout the dry sandy hillsides all over the park.

At the extreme south end of this hillside, just above a retaining wall two feet from the asphalt path around the pond, a rare prairie Agrimony, Agrimonia pubescens was found. This is a native species with western affinities, and is new to the flora of York, Halton and Peel Counties. In fact there are only four records of this plant occurring in Ontario.

The south-facing hillside is somewhat less interesting, although near the water's edge Sporobolus cryptandrus or Dropseed can be found along with Scouring Rush (Equisetum hyemale var. pseudohyemale). Further in towards the base of the 'U' Desmodium canadense predominates, intermingled with Red Raspberry (Rubus strigosus var. canadensis), escaped cultivated Roses (Rosa sp.), Climbing Bittersweet (Celastrus scandens) seedling Elms (Ulmus sp.), Heart-leaved Aster (Aster cordifolius), and Woodland Sunflower (Helianthus divaricatus). At the bottom of this hill, however, there is considerable weedy growth, with Spiny-leaved Sow-thistle (Sonchus asper) Prickly Lettuce (Lactuca serriola), Canada Thistle (Cirsium arvense) and Plantain (Plantago rugelli) predominating. The slope above the Cup-plant, is also heavily infiltrated with the Tawny Day-Lily (hemerocallis fulva) a widespread garden escape. Moth Mullein (Verbascum blattaria) is another interesting native species that colonizes disturbed ground. It is a plant with southern affinities and is unusual in the Toronto region.

It is important to realize that these unusual species are growing in close proximity to a highly traveled and populated area, the pathway around Grenadier Pond. To protect the precarious position of many of these rare plants, no further development of the surrounding area should be undertaken, and if possible another route to the bottom of the hill should be made available so as to divert traffic flow away from this sensitive and highly unusual region.

AREA F

This portion of the park is relatively small and is sandwiched between Areas E and G. It consists of a disturbed open area on top of a hill overlooking the southeast corner of Grenadier Pond to the west, and descending into relatively undisturbed ravines to the east. The open area provides a shortcut from the Queensway streetcar stop and Grenadier Pond and thus is much travelled.

Many native species, however, are still present here, among them Early Goldenrod (Solidago juncea), Heath Aster (Aster ericoides) and many plants of Desmodium canadense the Bush Tick-trefoil. Both species of Sunflowers, the Ten-petalled Sunflower (Helianthus decapetalus) and the Woodland Sunflower (Helianthus divaricatus) are found here as well as plants characteristic of disturbed ground; Wild Bergamot (Monarda fistulosa), Heal-All (Prunella vulgaris), and several species of introduced grasses: Bromus commutatus, Phleum pratense or Timothy Grass, and Dactylis glomerata. Numerous garden escapes also occur here including at least two species of cultivated Cherry, one an ornamental tree, and the other an orchard tree.

As one goes eastward and approaches the ravines, the flora changes to that typical of most of the rich deciduous ravines on the park. Here Dogwoods, (Cornus rugosa and Cornus stolanifera), Speckled Alders (Alnus rugosa), and Raspberry and Blackberry canes (Rubus sp) dominate with a typical ground layer of Spotted Crane'sbill (Geranium maculatum) Trilliums (Trillium grandiflorum) and the Helleborine orchid (Epipactis helleborine). Doubtless the spring flora would be much more diverse.

This area is not unusual in any way and has no rare plants in it. Nevertheless it again provides that vital buffer zone between a highly populated recreational area such as Grenadier Pond, and the walkway from the Queensway, and protects the much more unusual flora in the ravine to the immediate east (Area G).

AREA G

This area consists of an open ravine situated between two parallel hills, separating it from Grenadier Pond on the west side, and from the hill rising up to Howard Road to the east. The southern boundary of this ravine is Queensway Ave., while at the north end, the two hills converge and a pathway extends between them to rise up to a point close to the Howard Monument. This area is important because it contains plants not found elsewhere in the park.

Along the bottom edges of the hills on both sides of the ravine can be found plants characteristic of a rich Beech-Maple woods: Mayapple (Podophyllum peltatum), Red Baneberry (Actaea rubra), White Baneberry, or Doll's Eyes (Actaea alba) Spotted Cranes-bill (Geranium maculatum and False Solomon's Seal (Smilacina racemosa).

Further up the hill, particularly towards the south end of the ravine, may be found Blackberries (Rubus allegheniensis), Red Raspberries (Rubus strigosus var. canadensis) and Dogwoods (Cornus rugosa, Cornus stolonifera. Two Loosestrifes are also found here - the Swamp Candles (Lysimachia terrestris), and the unusual hybrid between Lysimachia terrestris and Lysimachia quadrifolia the Hybrid Loosestrife, Lysimachia producta. This plant is not found anywhere in York, Halton and Peel Counties Many of these plants exist in close proximity to areas which are habitually mowed; great care must therefore be taken to ensure that they are not accidentally destroyed, either through mowing, the use of weed killers or some other disturbance.

Further north in the ravine, about half-way up the east-facing slope are situated two ferns. Lady Fern (Athyrium filix-femina) grows abundantly here as well as in other sections of the park, but Interrupted Fern (Osmunda claytoniana) is known from only one other location in the park, and in each area is limited to a single clump of plants.

On the east side of the ravine, one encounters a large stand of Climbing Bittersweet (Celastrus scandens) as well as Wild Bean or Groundnut (Apios americana). This is a rather unusual species for the Toronto area, and is found in only one other location in the park. Its brownish-purple flowers appear in late August, and this particular stand is the only only one which flowered.

Towards the north end of the ravine, as one proceeds up the path toward the Howard memorial, the area becomes increasingly populated with introduced species and garden escapes among them the extremely showy Tawny Day-Lily (Hemerocallis fulva). The flat expanse in the bottom of the ravine is also much disturbed, with weedy species such as Wild Bergamot (Monarda fistulosa) and Heal-all (Prunella vulgaris) in abundance.

In general, this ravine has withstood the heavy use it sees without much damage. Little needs to be done to protect the area, other than recognizing that interesting plants do exist here, and taking every step necessary to make sure that no harm comes to them.

AREA H

Area H consists of a rather nondescript hillside extending between Howard Road to the west, and Deer Pen Road to the east. Here much of the original landscape has been disturbed and many introduced species are present.

The Himilayan Balsam (Impatiens glandulifera) is a garden escapee that is spreading all over disturbed areas within the park. Large patches of it are found at the southern end of this hillside. Towards the north, the hillside becomes steeper, and the dominants here are Chokecherries (Prunus virginiana), and various Brambles (Rubus strigosus var. canadensis). The canopy is again dominated by Red Oak (Quercus borealis), but many other species, including Black Cherry (Prunus serotina), and a cultivated species of Poplar, the White Poplar, (Populus alba).

The entire area is not too interesting, botanically, due to the fact that it is so disturbed and not very diverse in its flora. However the dense vegetation does provide a tremendous resource for birds in terms of food and cover, and also acts as a barrier against erosion of the sandy soil on this steep hillside. Finally it serves as a "wild" island area between, the pavement of Howard Road, and the disturbed area around the animal pens at the bottom of the slope.

AREA I

Area I consists of a hillside which at one time formed a ridge between two depressions - to the west, a swamp, and to the east, the lower Duck Pond. The swamp however has been filled in (1961-1962) with considerable disturbance of the once natural area. The area in question is small, extending in a south-eastwardly direction for approximately 100 feet.

It does, however, contain a few plants which are not found elsewhere in the park. For example, this is the only location in the park for Shrubby St. John's-wort (Hypericum prolificum). This

plant is readily identified by its winged twigs and the woody nature of the previous year's growth. Only one plant was found, and the possibility exists that it is a cultivated specimen. However, although it is a southern species, its northern limit does include southern Ontario. In any case it is an interesting record, since there are only two recrods of plant in Ontario, and none for York, Halton and Peel Counties.

The rest of the hillside if fairly typical. The slopes are dominated by Dogwoods (Cornus rugosa and Cornus stolonifera) as well as many species of Honeysuckle. Included are two native species, the Fly-Honeysuckle (Lonicera canadensis) and the Wild Honeysuckle (Lonicera dioica). Cultivated species include the Tatarian Honeysuckle (Lonicera tatarica) and a possible hybrid between Lonicara morrowii and Lonicera tatarica, Lonicera xbella. This plant has bright orange berries and pubescence intermediate between the two species. However, one must wait till early summer for flowering material to verify this identification.

Although this hillside is much disturbed and is not in itself unique, it does contain some interesting plants, and forms a vital natural buffer between two recreational areas, and for this reason should not be further disturbed.

AREA J

Much less than an acre in size, this deep, almost circular ravine between two parallel hills is just another example of the many hidden 'pockets' of interesting vegetation to be found in High Park.

At the top of the hill one encounters the typical rich woodland habitat with Red Oaks (Quercus borealis), and Red Maples (Acer rubrum) predominating. Underneath this canopy are extensive patches of Chokecherry (Prunus virginiana) as well as Blackberries (Rubus

allegheniensis) and Red Raspberries (Rubus strigosus var. canadensis) and shrubs such as Round-leaved Dogwood (Cornus rugosa), Red Osier Dogwood (Cornus stolonifera), Maple-leaved Viburnum (Viburnum acerifolium) and Nannyberry (Viburnum lentago).

As one progresses down the steep slope, the environment becomes much cooler and moister and a different flora, one with more northern affinities results. Plants such as Bunchberry (Cornus canadensis), Corn Lily (Clintonia borealis) and False Solomon's Seal (Smilacina racemosa) are found here. The only other stand of Interrupted Fern (Osmunda claytoniana) in the park is also located on this steep east-facing slope, along with a large colony of Lady fern (Athyrium filix-femina).

At the bottom of the hill, to one's surprise is a tiny, but very rich marshy area. Here is found the largest stand of Arrow-head (Sagittaria latifolia) left in the park, as well as the only location for Water Plantain (Alisma plantago-aquatica) in the park. A large stand of Iris (probaly Iris pseudacoris) grows over five feet high, admidst extensive patches of Rice-Cutgrass (Leersia oryzoides).

Unfortunately, this area, like so many of the ravines in the park, has been disturbed, as is evident by the twenty or so uprooted stumps near the edge of this tiny marsh. This practice of using deep ravines as garbage dumps must be discontinued since it is often in these very areas that very unusual plants are found. This particular area is very rich, and no further disturbance can be tolerated. The stumps should be removed without the use of heavy equipment that would further jeopardize the existing vegetation.

AREA K

This ravine is another in High Park that has northern affinities. It is situated parallel to the extreme east end of Deer Pen Road, on a hillside just above a parking lot. Although the slope is not

too steep, it is predominantly north-facing and thus has a somewhat cooler microclimate, encouraging the growth of more northern species.

The slope here has scattered Red Oaks (Quercus borealis) on it, but thickets are dominant here. Shrubs found here include Round-leaved Dogwood (Cornus rugosa), Red Osier Dogwood (Cornus stolonifera), Beaked Hazelnut (Corylus cornuta), and Speckled Alders (Alnus rugosa). Beneath this shrub layer, exists a minimal ground cover, consisting of scattered plants of Trilliums (Trillium grandiflorum, Trillium erectum), False Solomon's Seal (Smilacina racemosa) and the Helleborine Orchid (Epipactis helleborine), an introduced species and the only orchid in the park. The Blue-Bead Lily or Corn Lily (Clintonia borealis) is a species of somewhat northern affinities which is found here, along with Wild-Lily-of-the-Valley (Maianthemum canadense) and Bunchberry (Cornus canadensis).

However this area is primarily of interest because it is the only location in the park for Indian Cucumber Root (Medeola virginiana). About seven plants are located at the bottom of the slope right next to the path, and only yards from a mowed and sodded area, and the parking lot. It is imperative that measures be taken to ensure that these plants are not destroyed, and, if possible, access to this pathway, particularly at this end, should be restricted.

This area, in recent years, contained several plants of Rose-Twisted Stalk (Streptopus roseus). However, an extensive search this year failed to locate any of the plants, and it is to be feared that it has disappeared, as have so many other unusual and interesting plants within the park.

The value of this slope as a reservoir of other unusual species must not be under-estimated, and every effort should be made to keep this area intact and undisturbed.

AREA L

This area consists of a wooded hillside stretching northward from Deer Pen Road to Centre Road. To the east is the stream at the bottom of a steep west slope; to the west is another open ravine (Area H) that runs below the hill on which Colbourne Lodge is located. Area L provides a natural area buffer between two areas that have been or are currently being developed for recreational use.

The ravines to the east of the pathway that runs along the top of the hill are rich and densely thicketed. Abundant shrubby species include: Round-leaved Dogwood (Cornus rugosa), Red Osier Dogwood (Cornus stolonifera), Maple-leaved Viburnum (Viburnum acerifolium) Sheepberry (Viburnum lentago, and Beaked Hazel (Corylus cornuta). Further down the hill, in moist areas near the stream Alders (Alnus rugosa) is found. Brambles abound all over the hillside, with Rubus strigosus var. canadensis (Red Raspberry) and Rubus odoratus (Purple-flowering Raspberry) being most prominent. Wild Grape (Vitis riparia) and Wild Honeysuckle (Lonicera dioica) trail over these shrubs in places.

While the west slope is characteristic of rich deciduous woodland habitat found in many Toronto area ravines, the crest of the hill is much drier and has a correspondingly different flora. Moisture-loving shrubs disappear and plants more tolerant of dry sunny conditions prevail. Dominant grasses of these sites are Festuca ovina, Andropogon scoparius and Agrostis stolonifera. Amongst these grasses, many Asters and Goldenrods flower. The New-England Aster (Aster novae-angliae), Large-leaved Aster (Aster macrophyllus) and the Heart-leaved Aster (Aster cordifolius) are found along the path at the top of the hill along with Canada Goldenrod (Solidago canadensis), Early Goldenrod (Solidago juncea) and in some areas, local patches of the Stout Goldenrod (Solidago squarrosa). In areas less disturbed, and a little moister, the Ground Nut (Apios americana) grows along with Climbing Bittersweet (Celastrus scandens) and Spreading Dogbane (Apocynum androsaemifolium).

Towards the north end of this area, the hillside dies out to meet Centre Road. To the west of a stairway which descends to the road is a gentle north-facing slope of natural vegetation which is currently being nowed. However, in between the hummocks of Festuca ovina, are a large number of plants of Viola fimbriatula the Northern Downy Violet. This hillside should be left unmowed, since it is possible that many unusual species, particularly those such as Pedicularis or Viola with basal or low growing leaves have managed to survive the mowing and would reestablish themselves. Similar measures taken in other small areas in the park which are not used recreationally could have many beneficial results in terms of the natural beauty of the area.

The rest of this hillside in Area L should be left as is. It contains the largest stand of Apios americana in the park, as well as many interesting dry ground species. In addition it provides an important area for nesting and migrating bires in the area, and a buffer zone between two disturbed areas to the east and west. These buffers may seem small and insignificant, but they are extremely important in maintaining wildlife and allowing unusual plant species to survive, and possibly spread.

AREA M Spring Road Ravine

The Spring Road Ravine is one of the most unusual and perhaps the most threatened natural areas in High Park. It consists of a steep west slope running on the west bank of a small stream, and extends from the junction of Spring Road with Centre Road north to a point just opposite the tennis courts. At the top of this slope in a relatively open area, runs a wood chip path for joggers, while approximately half-way down the slope a winding, partly overgrown path exists.

The hillside itself is covered with dense thickets primarily of Alders (Alnus rugosa) Brambles (Rubus strigosus var. canadensis) Purple Flowering Raspberry (Rubus odoratus) Round-leaved Dogwood

(Cornus rugosa) Red Osier Dogwood (Cornus stolonifera) and Witch Hazel (Hamamelis virginiana). It is this dense cover, in many places totally obstructing the pathway, that has allowed the continued survival of tiny colonies of unusual plants found in this area.

The microclimate of this ravine is distinctly different from the rest of the park. The thickets provide deep shade for a large part of the day, and the incline is so steep that at the bottom, the temperature is significantly cooler. This has the effect of creating a more boreal environment, favourable to the growth of many species which are much more abundant further north.

For instance, this small ravine is the only known location in the park for Trailing Arbutus (Ipigaea repens) which is currently growing in two small patches right next to one of the paths that goes through the area. Another boreal species, Goldthread (Coptis groenlandica) is also found here, again in a precarious position. This colony consists of only twenty plants under an overhanging bank, only two feet from a main pathway. Other plants with northern affinities to be found in this ravine include: Bunchberry (Cornus canadensis), Wild-Lily-of-the-Valley (Maianthemum canadense), Blue-Bead Lily or Corn Lily (Clintonia borealis), and Wintergreen Gaultheria procumbens). The only locations in High Park for Partridge-berry (Mitchella repens) and Barren Strawberry (Waldsteinia fragarioides) are along a path in this ravine, and the Helleborine orchid (Epipactis helleborine) is abundant here. Twisted Stalk (Streptopus roseus) was recorded from this area in previous censuses, but a search this year was unsuccessful in locating it. Twinflower (Linnaea borealis) is another species with northern affinities that has been recorded from High Park, and undoubtedly grew in this area. Unfortunately, this plant has not been seen in the park for many years.

In more open areas, particularly towards the top of the slope, many interesting Asters and Goldenrods predominate including: Stout Goldenrod (Solidago squarrosa) - a rather unusual plant in High Park,

Hairy Goldenrod (Solidago bicolor var. concolor), Gray Goldenrod (Solidago nemoralis) Calico Aster (Aster lateriflorus), and the Heart-leaved Aster (Aster cordifolius). The Velvetleaf Blueberry, Vaccinium myrtilloides, is also present in the drier areas.

The Spring Road Ravine is a haven for birds as well. During migration many warbles are to be found in the thickets in the ravine. This deep thicketed ravine is one of the few such ravines in the park, and is an excellent example of how microclimatic factors can influence the local flora. Left undisturbed, many of the small colonies of unusual plant species should survive. However, access to the path through these sensitive areas should be limited if possible and directed towards the more open and less dangerously situated woodchip path at the top of the hill. No clearing of the obstructions of the pathway should be undertaken, nor should any fill in the form of dumping or the repair of eroded sites with landfill be deposited. This would only allow the introduction of vigorous weedy species into the ravine area, which might encroach on more fragile species. Unfortunately, at the exteme south end of this ravine area, the hillside has already been used as a dumping area for raked leaves; these leaves have effectively buried a small colony of Wintergreen (Gaultheria procumbens). This kind of action must be stopped if these unusual plants are to survive.

Measures that maintain or attempt to restore a natural area can be successful. The very fact that the Spring Road Ravine has been left overgrown and undeveloped has kept much of the interesting flora intact despite constant human use of the park. In addition, many areas which are currently being mowed, but have not been ploughed and sodded, have the potential to be restored to their natural state. For example, until recently a small hillside at the extreme south end of the ravine, in a dry open location, was regularly mowed. Observant naturalists however, noted the remains of interesting plants in the cut turf. On their request the area was not mowed, and the regrowth produced the only location in the park for the Common Lousewort (Pedicularis canadenis), and a plant which is not common in the

Toronto area. Other plants found in this area include Blue-eyed Grass (Sisyrinchium montanum), Spotted Crane's-bill (Geranium maculatum), and the Northern Downy Violet (Viola fimbriatula). All are flourishing now as a result of one simple procedure. Similar efforts like this all over the park, can have a tremendous impact on the preservation of natural areas.

AREA N Open Oak Woodland East of Spring Road

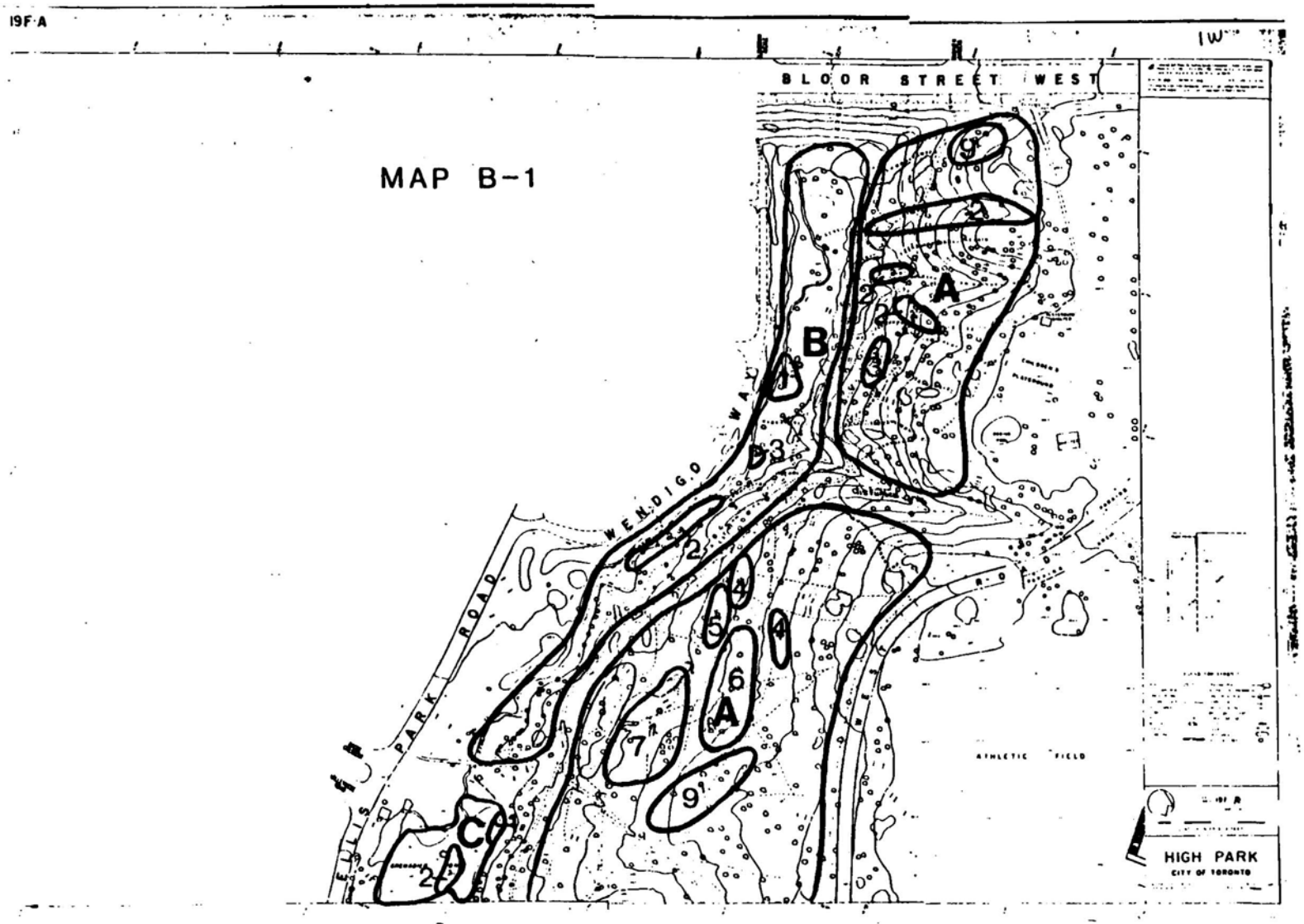
The area east of Spring Road is similar in many respects to the slope facing Grenadier Pond and Wendigo ravine in Area A. It too is characterized by dry open oak woodland habitat. Due to its proximity to Parkside Drive and the T.T.C. loop, and other facilities which are heavily used, this land has neither the abundance nor the diversity of plants that Area A has, but it still holds interest and contains in patches much of the original vegetation.

Here and there tufts of unusual grasses such as Turkey-Foot (Andropogon gerardi) and Indian Grass (Sorghastrum nutans) can be found. These are characteristic of prairies in Ontario and have western affinities as well. Huckleberries (Gaylussacia baccata) are present as well as two species of Blueberries Vaccinium angustifolium and Vaccinium myrtilloides. It is of interest to note that the latter species (V. myrtilloides) found only on the east side of the park, replaces Vaccinium vacillans which is found only on the west side of the park. Sunflowers (Helianthus divaricatus and Helianthus decapetalus), Asters, and Goldenrods also are locally abundant and are similar to those found on the west side of the park in Area A.

In addition a number of unusual plants are found growing along the path which runs parallel to Spring Road. The only location of Soapberry, or Buffaloberry, as it is sometimes referred to, (Shepherdia canadensis) in the park was, in previous years found next to this path. However a detailed search this year failed to

locate this lone shrub and it is possible that it has succumbed, as have all too many plants once within the park. On dry sandy slopes close to the path Wintergreen, (Gaultheria procumbens) is thriving. This represents only the second location for it in the park. The few White Cedars (Thuja occidentalis) and Hemlock (Tsuga canadensis) to be seen in the park as well as the more common White Pine (Pinus strobus) are also located in this area.

Although subjected to much traffic and disturbance, this area should be left alone in terms of development as much as possible in order to preserve the remaining vestiges of a once more extensive prairie-like habitat. Measures such as less frequent mowing and leaving small areas of interest totally undisturbed, will do little to detract from the area's recreational use but much to maintain its natural beauty.


MAP B-1
BLOOR STREET WEST
WENDIGO WAY
ELLIS PARK ROAD
ATHLETIC FIELD
HIGH PARK
CITY OF TORONTO
A
B
B3
C
2
3
5
6
7
9

MAP B-2

Area A

1. Hieracium canadense, Vaccinium angustifolium, Gaylussacia baccata
2. Sassafras albidum, Solidago nemoralis, Lespedezea capitata, Lespedezea hirta, Campanula rotundifolia Ceanothus americanus, Pteridium, aquilinum, Solidago hispida, Vaccinium angustifolium, Liatris cylindracea, Helianthemum canadense, Lechea intermedia, Myrica asplenifolia, Helianthus divaricatus, Helianthus decapetalus
3. Lespedezea capitata
4. Lespedezea capitata, Lespedezea hirta, Campanula rotundifolia, Helianthemum canadense
5. Physalis peruviana
6. Andropogon gerardii, Sorghastrum nutans
7. Helianthus decapetalus
8. Ceanothus americanus

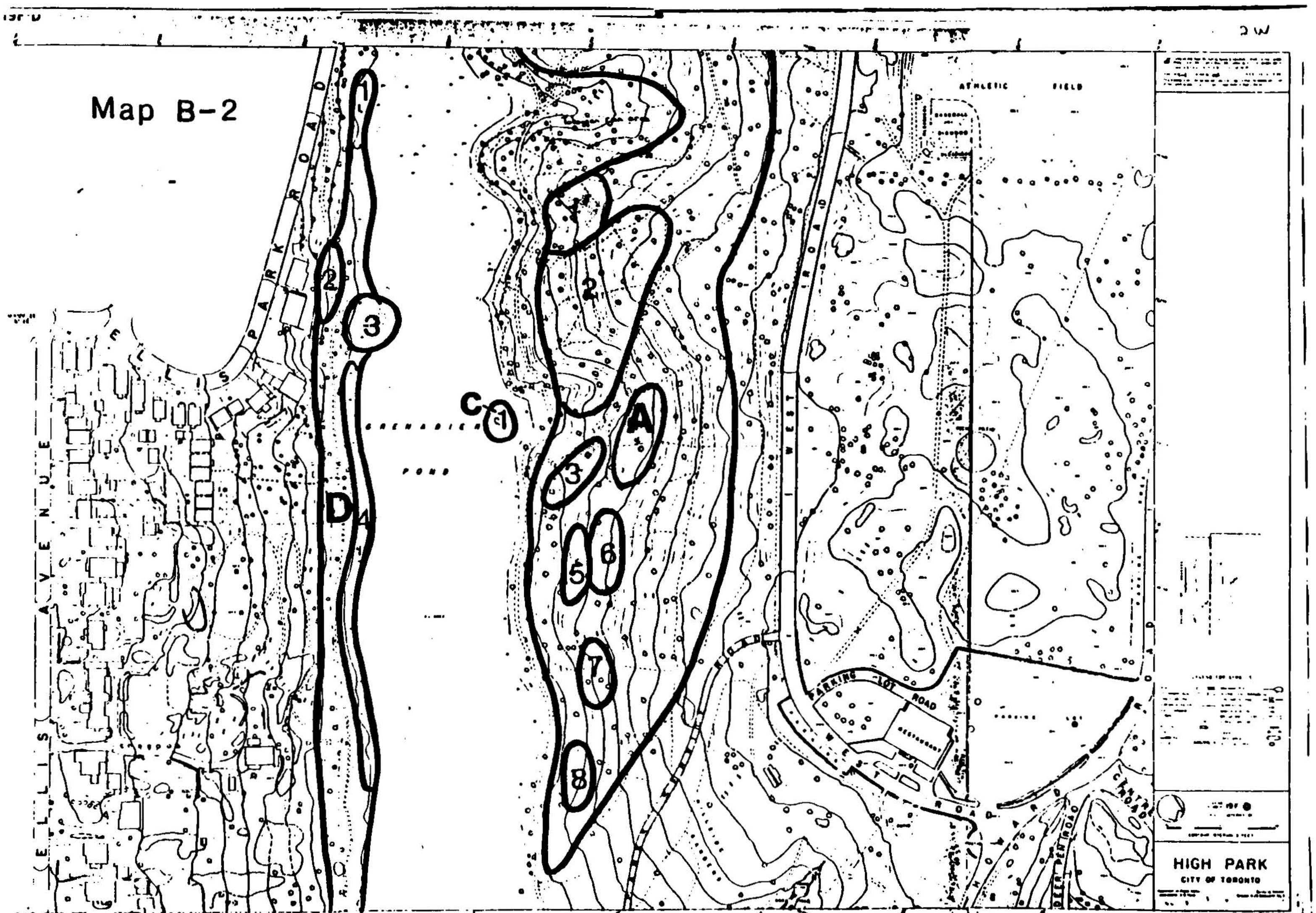
Area C

1. Nymphaca odorata

Area D

1. Sagittaria latifolia
2. Thelypteris palustris var. pubescens, Osmunda sensibilis, Athyrium filix-femina
3. Decodon verticillatus
4. Acorus calamus, Iris pseudacorus

Map B-2


ELLIS AVENUE
PARK ROAD
WEST ROAD
PARKING LOT ROAD
ATHLETIC FIELD
DEER PEN ROAD
D
C-1
A
1
2
3
5
6
7
8
HIGH PARK
CITY OF TORONTO

MAP B-3

Area D

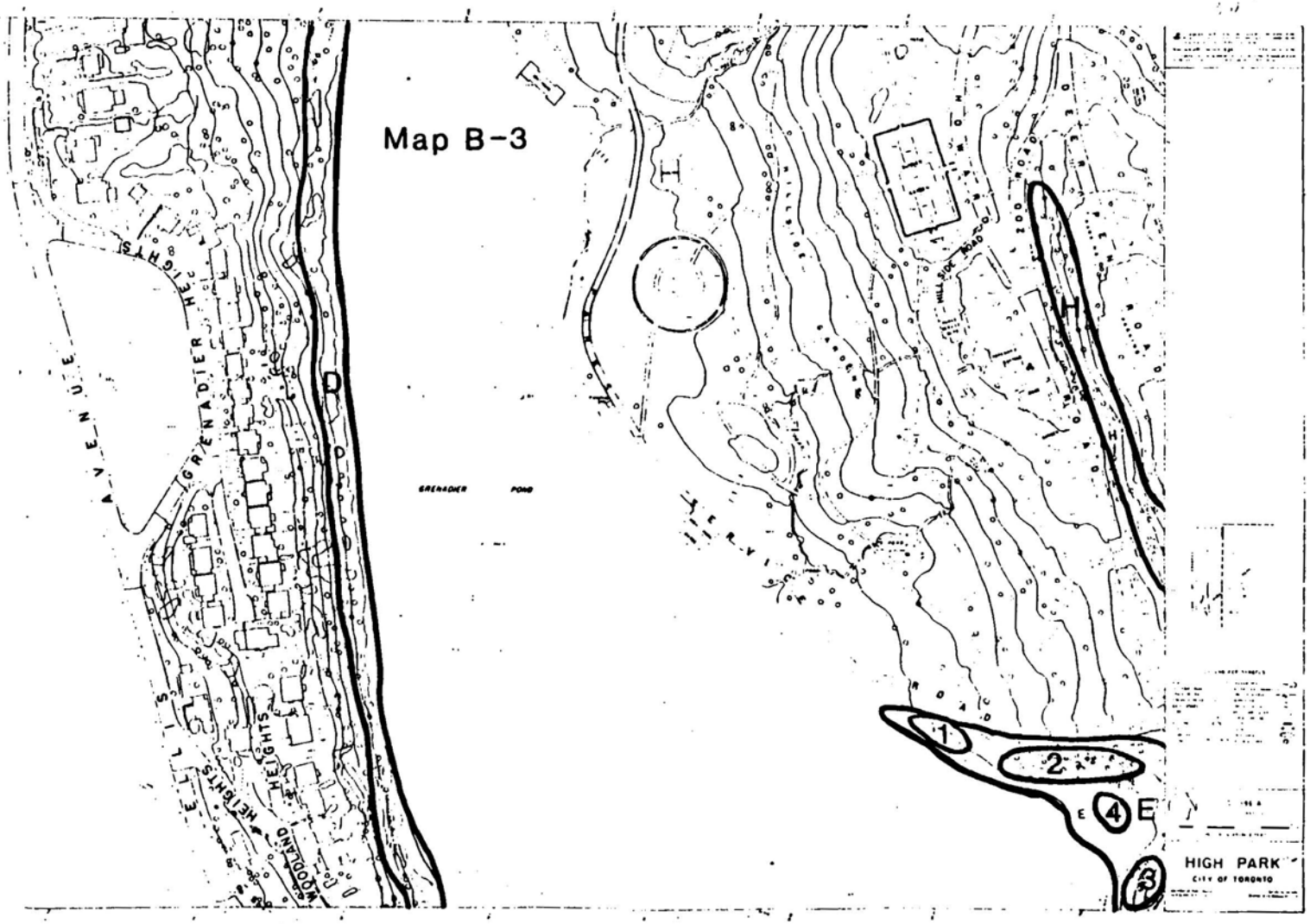
Lining the shores is Acorus calamus, Iris versicolour and Iris pseudacorus

Area E

1. Equisetum hyemale, Sporobolus cryptandrus
2. Lespedezea capitata, Celostrus scandens, Solidago nemoralis, Sassafras albidum, Campanula rapunculoides, Desmodium canadense
3. Agrimonia pubescens
4. Nymphaea adorata, Potamogeton pectinatus, Potamogeton crispus

Area H

Prunus virginiana all along hillside


19E A
Map B-3
GRENADIER HEIGHTS AVENUE
GRENADIER POND
MEADOWLAND HEIGHTS
HILL SIDE ROAD
HIGH PARK
CITY OF TORONTO

MAP B-4

Area F

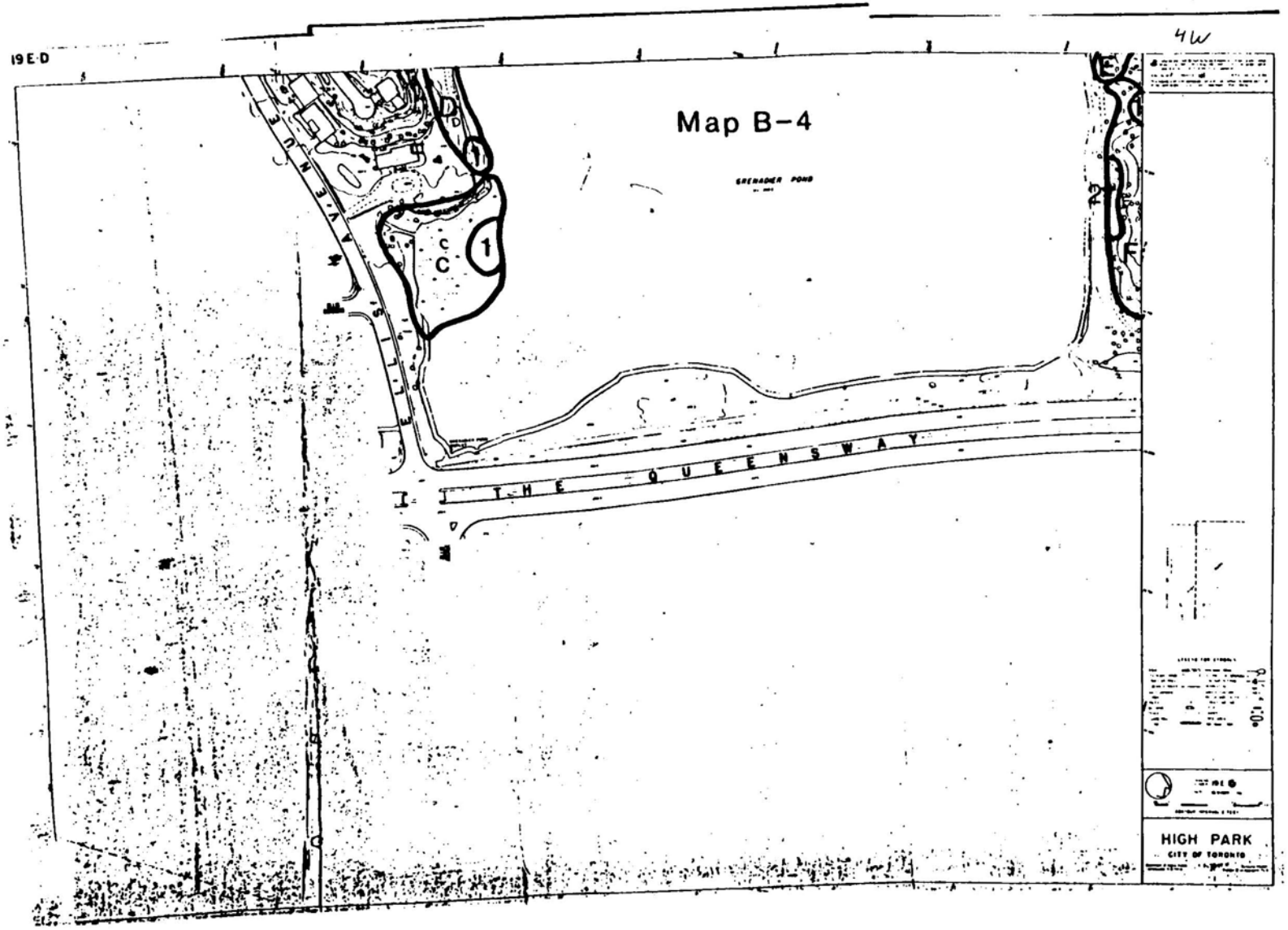
1. Helianthus decapetalus
2. Desmodium canadense

Area D

1. Lycium halimifolium

Area C

1. Nuphar variegatum
   Typha latifolia throughout the rest of the marsh


19E-D
4W
Map B-4
GRENADIER POND
C
C
1
1
THE QUEENSWAY
HIGH PARK
CITY OF TORONTO

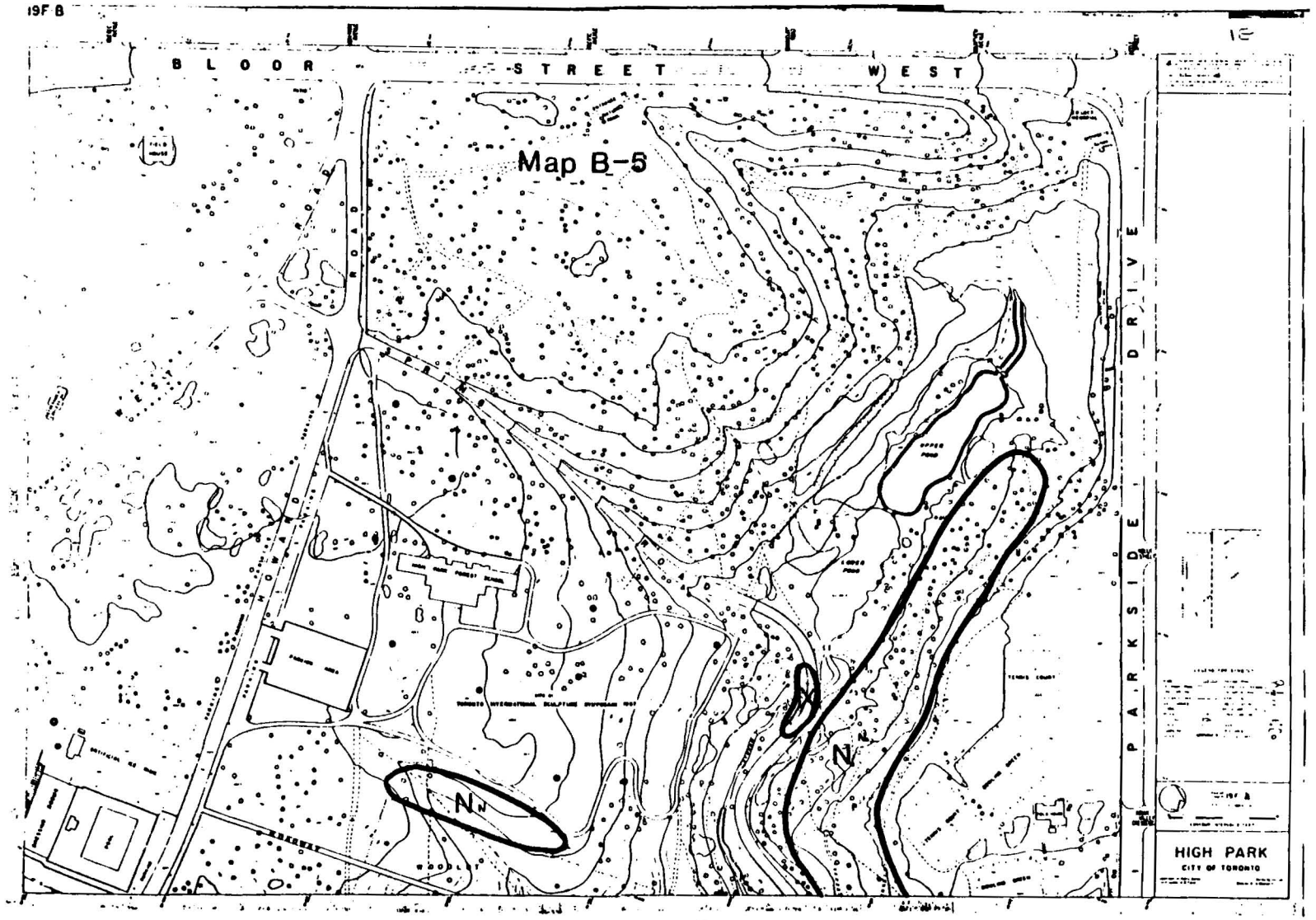
MAP B-5

Area X

Former location of Aster laevis and Asclepras exaltata

Area N

This area was not formally studied, but contains many of the species in Area A although none in as great profusion


19F B
BLOOR STREET WEST
Map B-5
PARKSIDE DRIVE
HIGH PARK
CITY OF TORONTO

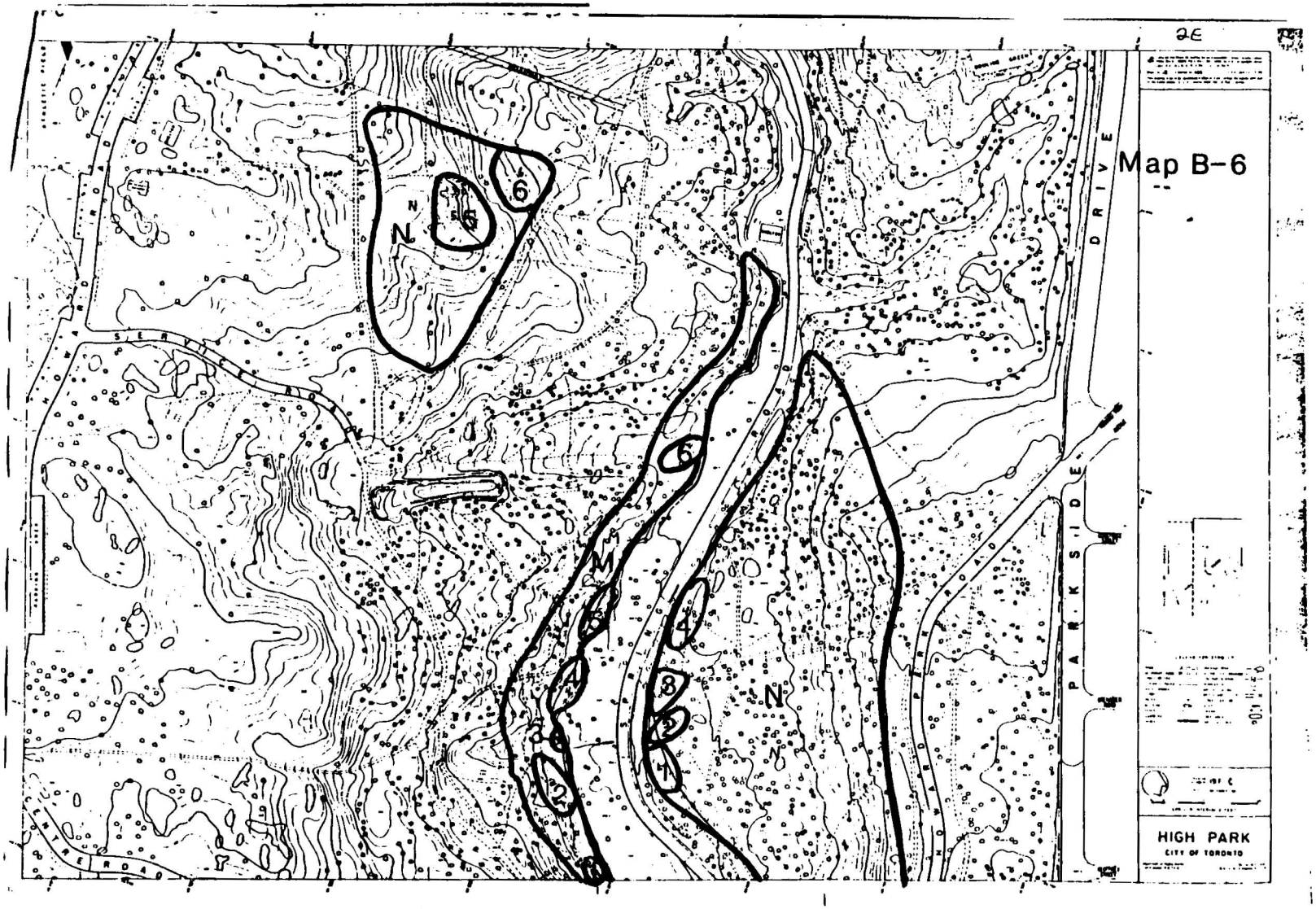
MAP B-6

Area M

1. Epigaea repens
2. Cornus canadensis, Epigaea repens, Coptis groenlandica, Waldsteinia fragarioides, Mitchella repens
3. Osmunda sensibilis
4. Solidago graminifolia (former habitat of Osmunda cinnamomea)
5. Aster puniceus
6. Cryptotaenia canadensis, Sicyos angulatus, Sambucus canadensis

Area N

1. Andropogon gerardii
2. Gaylussacia baccata
3. Tsuga canadensis
4. Campanula rotundifolia, Caultheria procumbens, Vaccinium myrtilloides, Salix humilis
5. Sassafras albidum, Lespedezea hirta, Lespedezea capitata, Cyperus sp. Sorghastrum nutans, Andropogon gerardii
6. Solidago nemoralis, Sassafras albidum, Sorghastrum nutans, Lespedezea capitata, Andropogon gerardii


2E
Map B-6
PARKSIDE DRIVE
HIGH PARK
CITY OF TORONTO

MAP B-7

Area H

1. Impatiens glandulifera
2. Cornus stolonifera
3. Prunus virginiana, Acer rubrum, Quercus borealis, Isuga canadensis, Betula lutea, Solidago canadensis

Area J

1. Viburnum acerifolium, Podophyllum peltatus, Osmunda claytoniana, Trillium grandiflorum, Osmunda sensibilis
2. Iris pseudacorus, Leersia oryzoides, Sagittaria latifolia, Lemna minor

Area K

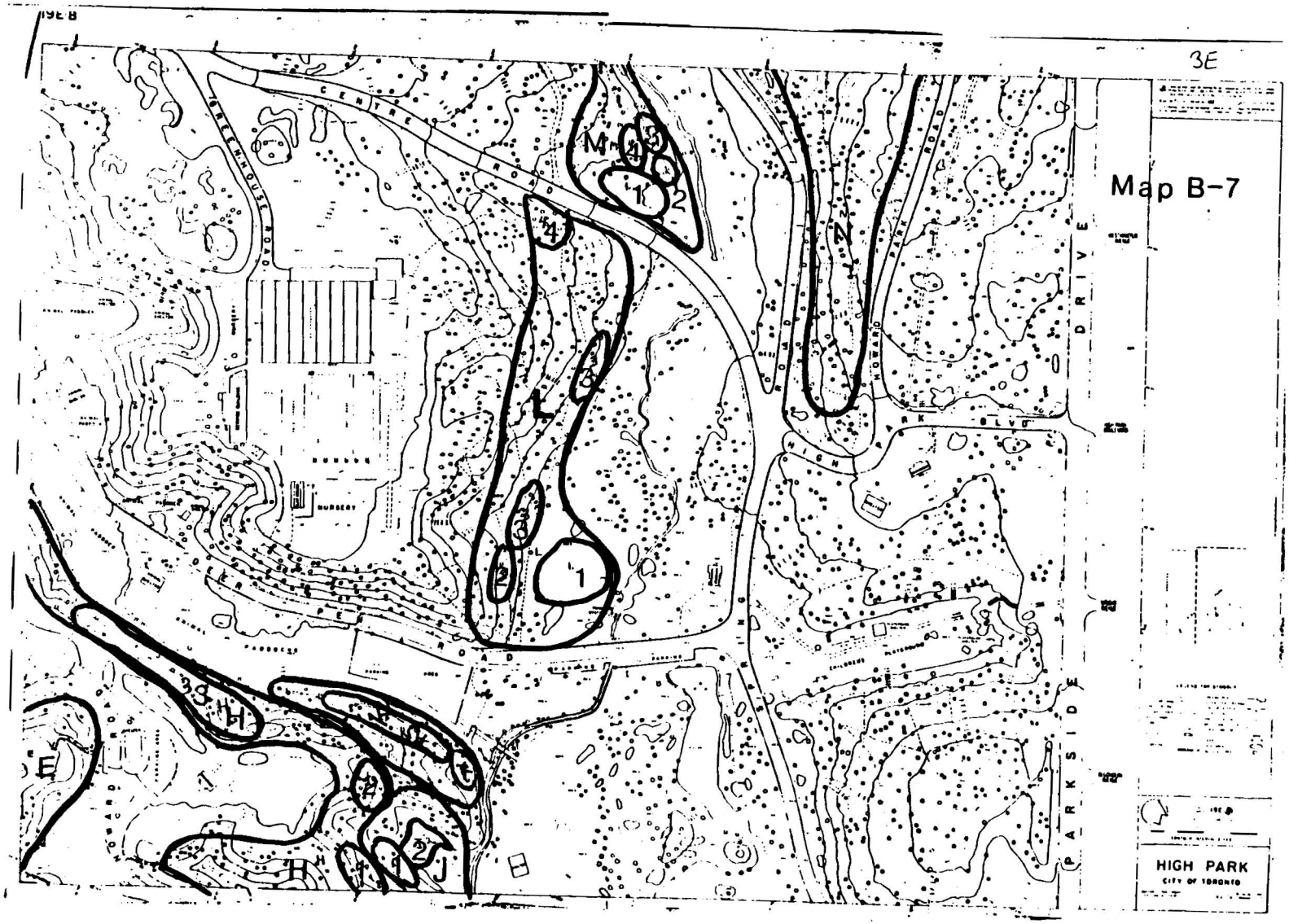
1. Medeola virginiana, Thelypteris palustris, var. pubescens
2. Clintonia borealis, Somilacina racemosa, Epipactis helleborine, Cornus canadensis, Trillium grandiflorum

Area L

1. Leersia oryzoides, Epilobium coloratum, Polygonum natans
2. Helianthus divaricatus
3. Apios americana
4. Viola fimbriatula, Solidago bicolor, var. concolor, Aster macrophyllus

Area M

1. Hieracium canadense, Pedicularis canadensis, Ceanothus americanus, Maranthemum canadense, Geranium maculatum
2. Vaccinium myrtilloides
3. Gaultheria plocumbens, Cornus canadensis
4. Solidago squarrosa


3E
Map B-7
HIGH PARK
CITY OF TORONTO

MAP B-8

Area G

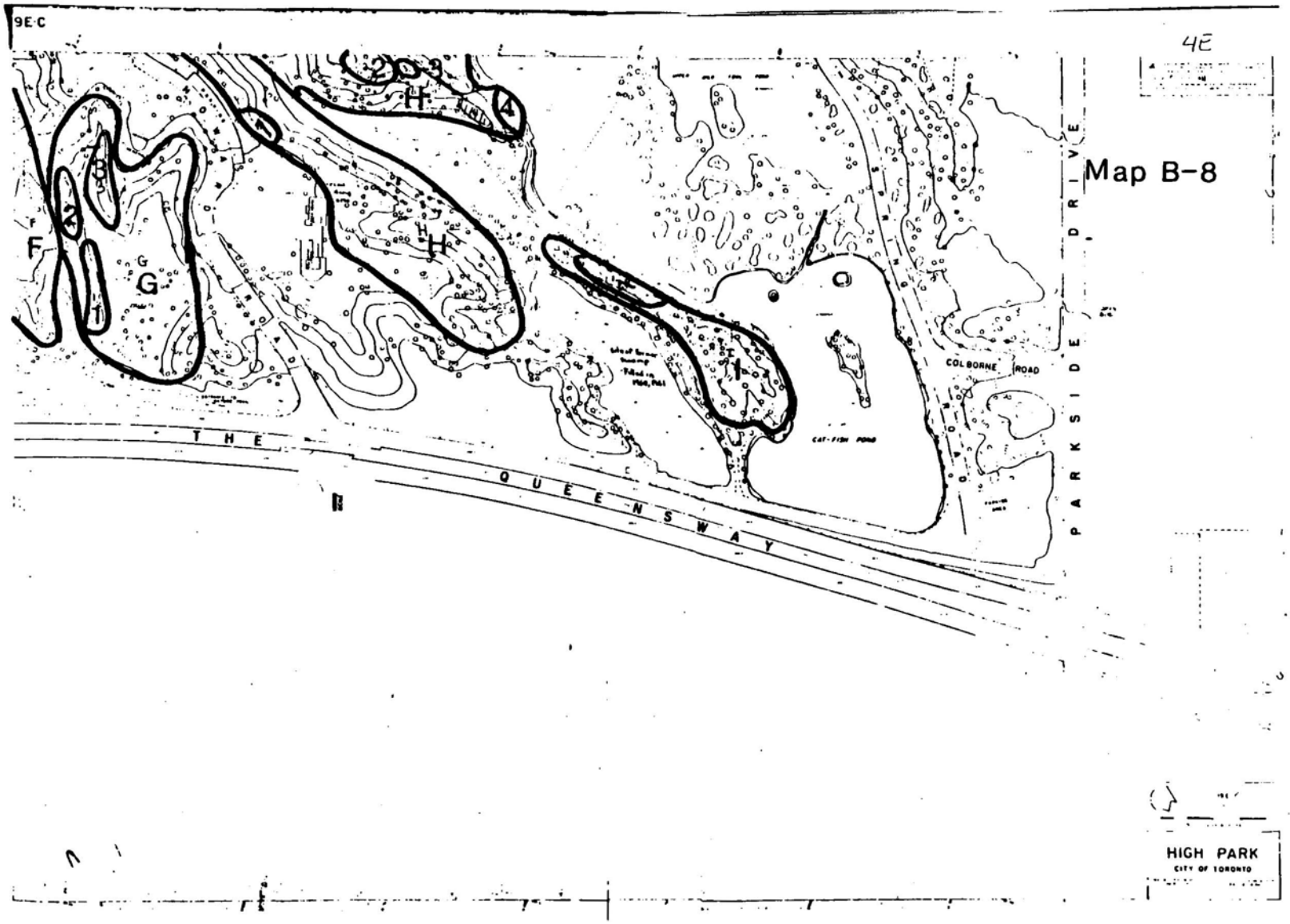
1. Rubus sp., Lysimachia x producta, Lysimachia terrestris, Desmodium canadense, Podophyllum peltatum, Solidago flexicaulis
2. Athyrium filix-femina, Osmunda claytoniana, Podophyllum peltatum
3. Actaea alba, Actaea rubea, Apros americana, Geranium maculatum, Celastrus scanolens

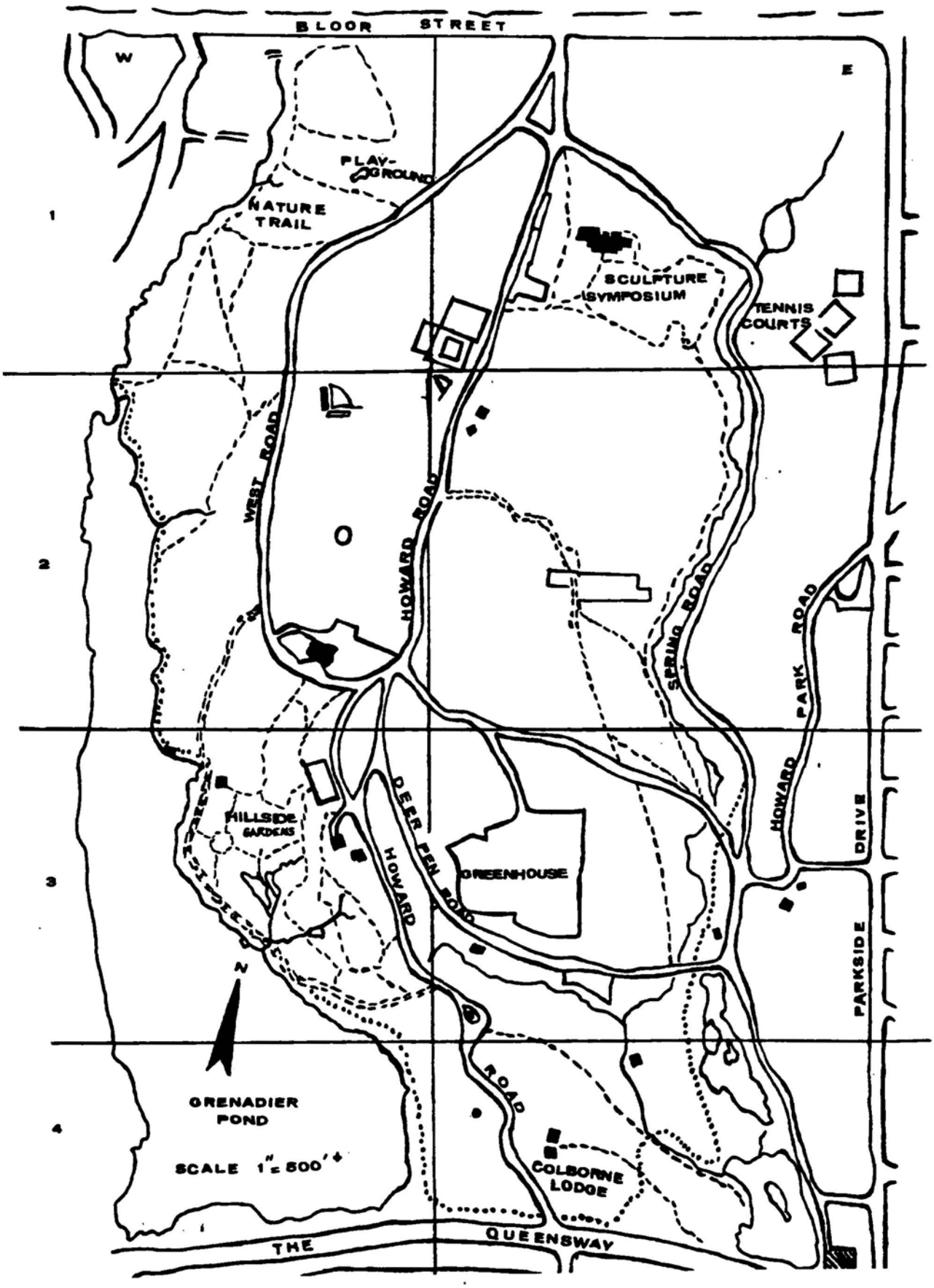
Area H

1. Solanum dulcamarum, Echinachloa crisgalli, Setaria verticillatus
2. Aster cordifolius, Aster azureus, Desmodium canadense
3. Rhamnus cathartica, Rhamnus frangula
4. Iris pseudacorus, Polygonum hydropiperoides

Area I

1. Lysimachia quadrifolia, Lonicera prolifera, Hypericum prolificum, Lonicera dioica


9E-C
4E
Map B-8
F
G
H
C
COLBORNE ROAD
PARKSIDE DRIVE
THE QUEEN S WAY
HIGH PARK
CITY OF TORONTO


BLOOR STREET
W
E
PLAY-GROUND
NATURE TRAIL
SCULPTURE SYMPOSIUM
TENNIS COURTS
WEST ROAD
HOWARD ROAD
SPRING ROAD
PARK ROAD
HOWARD PARK DRIVE
HILLSIDE GARDENS
DEER PEN ROAD
GREENHOUSE
PARKSIDE DRIVE
GRENADIER POND
SCALE 1" = 500'
COLBORNE LODGE
THE QUEENSWAY
1
2
3
4

Annotated Checklist of the Vascular Plants of High Park

(compiled by Karen McIntosh) 1976

Key

- H^+ = checked herbarium specimen
- H = herbarium specimen, not checked
- 1 = no record since 1966 (10 years or more)
- 2 = no record since 1926 (50 years or more)
- * = introduced
- E = escaped from cultivation (i.e. gardens)
- H = seen or collected in 1976
- O = species has disappeared between 1966 & present
- C = cultivated

LYCOPODIACEAE

2 Lycopodium lucidulum Michx. Shining Club-moss

reported by Scott (1913) as being "frequent in High Park", but rapidly disappearing. There has been no other record of this species in the park.

EQUISETACEAE

H^+ Equisetum arvense L. Common Horsetail

common under Cornus and Viburnum in Wendigo Ravine (Area B)

H^+ Equisetum hyemale L. Scouring Rush

var. pseumohyemale L.

locally abundant in Wendigo Ravine and a south facing slope in Area E

H^+ Equisetum littorale Kühl Horsetail

only 1 plant collected this year. Further specimens need to be checked before a final decision is made.

H^+ 1 Equisetum pratense Ehrh. Meadow Horsetail

Last collection made in 1939 by P.V. Krotkov

H^+ Equisetum sylvaticum L. Woodland Horsetail

infrequent in rich deciduous woodlands

OPHIOGLOSSACEAE

H^+ 2 Botrychium silaifolium (Gmel.) Rupr. Leathery Grape-fern

Scott (1913) reports "large specimens of this plant occur rarely in High Park, Toronto, in open sandy soil".
No other record, and probably is now not in park.