

there, though assuredly in small numbers.

Some of the residents were in the habit of using insecticides, herbicides and fertilizers. Coincidentally, most of them want the bank and Pond cleaned up, not perhaps aware that the use of some of these materials is often of a more insidious problem in making the environment "unclean" in other ways.

It is apparent that the west bank is in pretty good shape, even though most of the residents are not overly knowledgeable about what makes it so. It is strongly recommended that little alteration of the bank should be effected; most of the residents would tend to agree.

CONCLUSIONS

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 oak forest which dominates this slope contributes to the acidity of the soil. This resultant dry, acid, sandy soil found here, provides a habitat which is conducive to the growth of unusual plants. The open nature of the forest canopy has allowed the understory, particularly the herbaceous layer, to become extremely diverse. Many of the species have western affinities and a few are at the northern limits of their distribution. At one time most of the central portion of the park was probably similar to this open oak woodland but development has destroyed much of it. It represents the last extensive open oak woodland in the Toronto region and probably in York Region.

The Wendigo Way Ravine is densely thicketed with a rich variety of shrubs and a profusion of woodland plants, a vegetation community which is generally characteristic of many of the ravines to be found throughout Toronto. Introduced plant species show up here. It provides an excellent habitat for many species of birds, and it is one of the few areas in the park where the American Toad (Bufo americanus), once so plentiful in High Park, has been found.

The reduced marsh areas do not contain any unusual plant species but they do harbour species that are found nowhere else in the park and some which are not found elsewhere in the city limits. Furthermore, it is an important wildlife area.

The most interesting vegetation on the west side of Grenadier Pond is to be found in the narrow strip of marshline vegetation. This west slope is also an important area for birds.

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 areas which do not have any unusual plants are in their natural state and act as buffer zones between highly used recreational areas and the areas where rare plants are still growing. These buffers may seem small and insignificant but they are extremely important by allowing unusual plants to survive and possibly spread.

The occasional plant such as the cup-plant (Silphium perfoliatum), which is truly an indicator of the Carolinian Zone grows in High Park.

Some of the park areas which are in a natural state have been disturbed by man but despite this, uncommon plants are still flourishing in them. In these and other areas there are many hidden "pockets" of interesting vegetation. Such areas can act as reservoirs of unusual plant species and thus should not be ignored but kept intact and undisturbed.

The Spring Road Ravine is one of the most unusual and perhaps the most threatened natural areas in High Park. The microclimate of this ravine is distinctly different from the rest of the park, creating a boreal environment which is favourable to more northern plant species.

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.

Bird life in the park continues to show a good standard of diversity. The Park is an oasis in an urban area and birds are thriving, despite widespread changes involving the elimination of areas of natural cover and edges which has progressed over the many years of the Park's existence and which has accelerated in the past thirty years. It has been and still is a popular area for bird-watching. Good habitat still exists for a variety of resident or seasonally resident birds (about 70 species) and many migrants (about 130 species); a number of shore birds which frequent the nearby Sunnyside beach also call in at Grenadier Pond and, more rarely, the other small ponds. 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 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 but a number of different species were found to favour other areas of the Park which offered different habitat. These other areas include parts of the east bank of Grenadier Pond and Wendigo Ravine to the north, and pockets of mostly natural woodland in the south central and east portions of the Park.

A variety of larger 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.

Although many residents showed interest in the study and were able to supply some very interesting information, it was apparent that they generally have little knowledge about habitat improvement and wildlife food plants. Efforts to attract colourful birds through the use of feeders and birdhouses have been made by many. 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, as well as the authors, stress the importance of keeping this west bank in its present condition.

The water in Grenadier Pond is quite suitable for aquatic plant and animal life. The pond is highly eutrophic with high nutrient levels and a high rate of primary production. The chemistry studies indicate that the pond will support warmwater fish species; it has oxygen levels over 5 mg/l and high summer water temperatures.

There are some indications of pollution in the north end of the pond and in the inlet from Bloor Street. This may be a result of leakage from a sewage pumping station or from pollutants in the inlet from Bloor Street. Coliform counts were higher than levels allowed for body contact as listed by the Ministry of the Environment; swimming is prohibited in the pond.

Grenadier Pond is a productive body of water supporting a large population of warmwater fish consisting of 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 annually, are thriving in the pond and are also reproducing naturally. The pond will support more fish than are being stocked.

RECOMMENDATIONS

1. No pesticides or herbicides should be used in or adjacent to natural areas.
2. Weed control needs to be implemented in some form in areas of landfill e.g. the toboggan run. Manual removal of these weeds before they reach maturity and set seed is needed, but only by someone who is experienced in the local flora and who can distinguish fragile species from the more vigorous species while both are immature.
3. No dumping in any of the ravines should be allowed.
4. The paths in natural areas and in particular Area A, should not be 'improved', i.e. no asphaltting or wood chips should be laid down.
5. In reference to Area A, the open oak woodland, the expanse of natural vegetation currently mowed at the top of the hill, should be left unmowed. A survey of other unmowed areas shows that the natural vegetation is relatively open, and with few shrubs to conceal a clear view of the road.
6. Similarly, the entire recreational area, in large part consisting of picnic areas, is currently mowed. These areas were once very similar in their flora to the oak woodland to the west, and in many of these areas the natural western grasses (Festuca sp. Andropogon sp.) have not been removed but merely mowed. While it is realized that recreational areas are needed in the park, it should be possible to leave unmowed small patches, perhaps around groups of trees, and allow the natural vegetation to develop again. This would provide a more interesting relief to the otherwise flat expanse of picnic area, while at the same time creating additional habitat suitable for the preservation of many unusual western and dry ground species, and providing greater cover and feeding areas for birds. Finally the aesthetic appeal of the picnic areas would be enhanced without destroying their recreational value.

7. The open oak woodland vegetation is unique precisely because the habitat is one of open dry sandy soil. This open habitat is unusual in a forest of mature trees, and is uncommon in Ontario. In the past, this open habitat was maintained through accidental fires, and those set by Indians. Numerous studies have been done which suggest that fire is an extremely effective way to maintain prairies and prairie-like vegetation. Therefore it would be beneficial to maintain the open nature of the forest. This should preferably be done by controlled fires, either very early in the spring, before the plants have come up, or late in autumn when the plants have died back. An alternative, although less effective method would be to manually cut out the saplings, taking care not to damage any of the vegetation underneath. No machinery or heavy equipment should be used.

8. The wildflower garden, situated on the northwest bank of Grenadier Pond, while not specifically studied, deserves mention. The lack of a readily available water supply makes proper care of the garden time consuming. The area chosen is in a very heavy traffic zone and consequently children trample and destroy much of it. Furthermore many of the species chosen are dubious, to say the least. Some are cultivated rockery plants e.g. *Dianthus armeria*, while others are introduced flowers and not native to Canada. Still others are native plants but not those which are characteristic of any of the natural areas in the park. With such a tremendous and unique natural resource as exists in the many wild areas of High Park, where plants grow that are not found elsewhere in the city or in the County of York and with the park representing the northern limits of the distribution of several species and the eastern limit of one, it is unfortunate that so much emphasis and work has been put into creating a 'wildflower garden' which is pale in comparison, and so little emphasis placed on preserving the important natural areas still in the park. A large sign forbids the picking of plants in the wildflower garden; no such sign forbids the picking of Blueberries, Harebells, Prairie Asters and Goldenrods, Sunflowers and Elazing Stars. It is imperative to expend more time and effort into

maintaining and protecting the very features of the park that make it so unique and enjoyable for nature lovers; the rewards will be much greater with a minimal investment in time and money.

9. A lower water level in Grenadier Pond would allow the proliferation and gradual restitution of the seriously depleted cattail marsh, which would in turn provide more cover, nesting sites, and food for greater numbers of birds. It must be remembered that the patches of cattails now in the pond represents the last remnants of a once vast marshy shoreline. Enlarging the marsh would provide benefits for wildlife and allow other unusual marsh species to take hold again.

10. When the east shore of Grenadier Pond was dredged and a stone retainer wall installed in 1968 - 1969, the variety and diversity of the pond itself was seriously compromised. The marshes in the southeast corner which had gradually been disappearing over the years were completely degraded and an interesting marshy shoreline was wiped out. In some of the bay areas, particularly in the southeast corner of the pond, vegetation is beginning to return. In these bays a dense marshland cover should be encouraged particularly since the use of these areas is primarily by those people who appreciate the wildlife that such a marsh would attract.

11. The west shore of Grenadier Pond somehow escaped dredging in 1960. This is extremely fortunate because the west shore now represents one of the most interesting areas in the park. The teeming life of the west shore of the pond contrasts starkly with the sterile look of the denuded east shoreline. It is important that the west shore be protected from any extensive human interference.

12. Other practices in park maintenance should be reexamined. Filling in erosion sites with landfill is a dubious practice, and one which often leads to many problems. The soil in the park is an unusual acid sand, and as such, promotes the growth of specific types of vegetation. Filling in an eroded area with basic sand or

clay changes the soil environment drastically. Natural vegetation will not be able to spread into these areas, seeds of aggressive weeds are often introduced along with the landfill; consequently, the area becomes an eyesore and weed control becomes an additional problem, as mentioned before. All filling of eroded areas should be done only if other less disturbing measures have not been effective. Sand only should be used and measures should be taken to make it slightly acid, e.g. mulching it with oak leaves or leaching out the nutrients with an inorganic acid might both be helpful.

13. Land use surveys should be carried out to determine whether some areas which are currently being used as recreational sites get enough use as such to justify this. In this way areas currently put to little use may be allowed to grow back into natural areas again.

14. Stocking yearling or adult largemouth bass would be preferable to the planting of bass fry. Transferring occasionally large adult bass from over populated waters may be a worthwhile consideration.

15. The screen at the outlet should be improved to prevent the introduction of fish from Lake Ontario when the level of the water below the weir rises. This screen should also be improved so that garbage collecting against it will not raise the level of the pond. Fluctuations in water level could have deleterious effects of marsh plants that might be able to grown in the shallow at the north end of the pond.

16. The sewage pumping station at the north end should be checked to see if it does leak into the pond. If so the necessary work should be done to insure that it will not leak.

17. The inlet from Eloor St. should be traced to its source to find out if any shops or factories might be dumping into it. The creek would also be improved if the garbage was cleaned out between Eloor St. and Grenadier Pond.

18. Fishing regulations should be made available to the anglers at Grenadier Pond. Folders could be distributed at the boat house.

19. To preserve the diversity of bird life still found in the park it is imperative that much of the natural habitat be retained as it is and possibly enhanced. The west bank of Grenadier Pond with its lush plant growth is important for bird life and should be kept in its present condition.

A SUMMING UP

"We need nature as much in the city as in the countryside----
 ---. It is not a choice of either the city or the countryside;
 both are essential, but today it is nature, beleaguered in the
 country, too scarce in the city which has become precious."
 "Design With Nature", Ian L. McHarg.

The fascinating natural areas of High Park are undoubtedly worth
 preserving, adding as they do those touches of wildness to the
 overwhelming artificiality of the mowed grassy areas and planned
 gardens. People have to be constantly reminded that Nature, in
 all her diverse profusion, is not truly represented by the rock
 garden with its neat flower beds but by the "messy" luxurious
 plant growth covering the west bank of Grenadier Pond and the
 tangled growth in the Wendigo Ravine.

The changes that have occurred in the flora and fauna of High
 Park as a result of man's presence and activity should not be
 looked upon as an isolated event, applicable only to this
 particular natural area. It is the study of the changes and
 destruction that is happening in hundreds of natural areas in
 and around hundreds of cities or indeed, wherever man is present.

High Park is an example of what can happen when a unique natural
 area is 'developed' for recreational purposes without regard for,
 or without a complete understanding of the ecological processes
 which made the area interesting. It serves as a lesson to all of
 us that once a habitat is destroyed, the plants that grew there
 can never come back. The Creeping Snowberry (Gaultheria hispidula),
 Twinflower (Linnaea borealis), Fern-leaved False Foxglove
 (Aureolaria pedicularis), Prairie Crowfoot (Ranunculus rhomboideus),
 Hooded Ladies' Tresses (Spiranthes romanzoffiana and Fringed Gentians
 (Gentianella crinita ssp. crinita) will never again be seen in High
 Park, and this is truly unfortunate.

The destruction of a habitat, however, does more than eliminate a few plant species. The whole ecosystem associated with that vegetation is upset, and much of the wildlife disappears as well. The unusual dragonfly, an interesting butterfly and at least four species of frogs have not been seen in the park since their habitats were altered or destroyed, and it is highly unlikely that they will ever be seen here again. Similarly, clearing away shrubbery from some areas, destroyed not only the shrubs, but also rendered the area useless as a cover or food source for migrating birds.

In spite of these errors and their disastrous results, the outlook for High Park and other natural areas in urban settings is not totally pessimistic.

As our urban areas continue to expand efforts are being made to incorporate natural areas into these urban complexes. There is a growing realization in many minds that such natural areas, no matter how "dirty" they may appear, are a refreshing antidote to the overwhelming urbanization of so much of our human setting.

High Park is also an outstanding example of how, even with heavy usage and surrounded by urban development, unusual natural areas can hold their own, and even thrive, particularly if properly managed. Proper management, however, means more than putting up fences around protected areas or signs prohibiting the picking of wildflowers. Primarily it means understanding the whole ecology of an area, and the role which soil, light, and water have in creating a habitat suitable to the existence of a particular floral or faunal type. Detailed studies of an area by qualified biologists must be carried out and their recommendations carefully considered before any management plan can be implemented. Management of an area may, in some cases, involve simply doing nothing. leaving the area to develop on its own. On the other hand, more vigorous management may be needed to arrest successional changes which would, in time, eliminate the very plants which are so interesting.

Finally, there are areas in High Park, where human disturbance has disrupted the natural course of events and active measures must be taken to keep introduced species from overtaking native plants, or to protect vulnerable areas from further destruction.

Future development of any natural area for park use should be done only after a complete assessment is made of where recreational development will be the least harmful. Many unique natural areas can coexist relatively undisturbed with recreational areas, adding immeasurably to the beauty of the park and the enjoyment of the people who use it.

At the present time we possess in High Park both the wild and the tame, the uncut and the mowed, a pleasing combination of Nature's seemingly unplanned ways and man's cultivated approach. We should strive to maintain and even enhance that mixture for you see, we need both, one to instill in us a pride in cultivated gardens and the other to humble that pride and remind us of our roots!

ACKNOWLEDGMENTS

We would like to take this opportunity to thank all those people and institutions who gave their time and their knowledge to us in the preparation of this report. Without their aid, this report would be neither as comprehensive nor as valuable for future planning of High Park, and similar natural areas.

Miss Emily Hamilton, of the Toronto Field Naturalists Club Botany Group, assisted in the field and provided her personal list of locations of species within the park, as well as the check list prepared by the Toronto Field Naturalists.

The Herbarium staff at the Botany Department, University of Toronto, provided materials, manuals and space for the identification of plants.

Mr. Paul Catling, a PhD student in plant taxonomy at University of Toronto, supplied information concerning endangered species, and assisted in field identification. His knowledge of the floristic history of the park was appreciated.

Mr. Bill Earl, of the Toronto Parks Department, provided lists of cultivated plants used in the park, as well as dates in the park's development.

Mr. E. Lazda, of the Toronto Parks Department gave us detailed survey maps of the park.

We would like to thank the City Parks Department for the use of an office in High Park. The co-operation of various members of the T.F.N. Club (Toronto Field Naturalists Club) was much appreciated. Bird lists and other information were received from Mr. John A. Kelley, Mr. Clive E. Goodwin, Dr. J. Crammer-Byng, Mr. Harry Kerr and Mr. Viktor Zerov.

APPENDIX 6 Cont'd

STOCKING RECORDS FOR GRENADIER POND

MINISTRY OF NATURAL RESOURCES

Date	Species	Age	L	No. of Fish	Req. No.	Lot(s) and Con.(s)
1961 Sept	Northern Pike	A		13	13515	Canadian National
1961 Sept	L.M. Bass	A		13	"	Exhibition
1961 Sept	Perch	A		35	"	Transfer
1961 Sept	Rock Bass	A		23	"	
1961 Sept	Sunfish	A		32	"	
1961 June	L.M. Bass	A	14"	30	16264	From Mount Pleasant
1962 July	L.M. Bass	A		20	16316	From Mount Pleasant
1963 June	L.M. Bass	A	14-18"	30	16320	From Mount Pleasant
1963 June	Sunfish & Rock Bass			2000		From Rick Lake
1963 Sept	S.M. Bass	A		6	13561	Canadian National
1963 Sept	L.M. Bass	A		5	"	Exhibition
1963 Sept	Bullheads	A		23	"	Transfer
1963 Sept	Pike	A		2	"	
1963 Sept	Catfish	A		5	"	
1963 Sept	Perch	A		4	"	
1963 Sept	Rock Bass	A		3	"	
1964 Aug.	S.M. Bass	A		14	27867	From Lake Simcoe
1964 Aug.	S.M. Bass	A		24	27866	From Lake Simcoe
1965 Aug.	S.M. Bass			50	28028	From Lake Simcoe
1965 Aug.	Northern Pike			2	28029	From Lake Simcoe
1968 July	L.M. Bass	A		45(tagged)	37399	From Lake Simcoe
1969	S.M. Bass			51	13570	
1969 Aug.	Sunfish			108	13575	
1969	Perch			50	13574	
1969 to	R. Bass			13	13571	
1969 Sept	Bullhead			85	13573	
1969 June	S.M. Bass		6-14"	32	47932	
1972 July	L.M. Bass	Fg		1000		
1973	L.M. Bass	F		3000		From Westport
1974	L.M. Bass	F		2000		Fish
1975	L.M. Bass	F		1000		Culture
1976	L.M. Bass	F		2000		Station

APPENDIX 7

1969

T H E F I S H E S O F G R E N A D I E R P O N D

By WILLIAM A. TOUGH

The very name of the pond, despite many colourful and varied legends to the contrary, is generally now accepted by historical authority to have derived from the abundance of fish life inhabiting its waters as far back as the period prior to the War of 1812 when reputedly it was a favourite fishing spot for the Grenadiers of the garrison of Fort York. The fort at that time, was located far to the west of its present location at the foot of Spadina Avenue and much closer to the pond.

It is interesting to note that the pond has been effectively cut off from open contact with Lake Ontario since sometime prior to World War I, the Steel Company of Canada having exercised riparian ownership since that time thus diverting all waters flowing out of the lower end of Grenadier Pond to its Swansea works.

As recently as 1968 in a laudable example of cooperation between industry and the municipality in the interests of conservation, an amicable arrangement was worked out between the City of Toronto and Stelco whereby a weir (dam) was constructed at the point of egress in order to stabilize and maintain the water level of the pond. As long as excess water continues to flow over the top of this weir the Company continues to be supplied with water. In the event that the water level should drop sufficiently that there is no overflow, the Company then is entitled to open a valve in the dam to secure a flow to their plant provided that the level of the pond does not become lowered beyond a specific point agreed upon by both parties as being the minimum level to which the pond may fall.

T H E F I S H E S

(1) NORTHERN PIKE - Esox lucius Linnaeus

These are very few in number and are introduced from time to time principally from the display tanks at the Ontario Government Building during or at the close of the annual Canadian National Exhibition.

(2) LARGEMOUTH BASS - Micropterus salmoides (Lacepede)

These are regularly stocked by the Province of Ontario and are apparently reproducing as I have taken young of approximately 3" in the area of the Boathouse on the east bank, directly opposite on the west bank, and at the south-west corner near the marsh area.

- (3) ROCK BASS - Ambloplites rupestris (Rafinesque)

These are mainly found at the southern end of the pond particularly in the vicinity of the large submerged rock pile near the south-east shore.

- (4) BLACK CRAPPIE - Pomoxis nigromaculatus (LeSueur)

These abound in considerable numbers and although not usually obviously visible, they become so during the spawning period when they visit the shoreline in vast numbers. I have observed them in numbers which must have run to the thousands at such a time over a horseshoe shaped area running from the Boathouse on the east bank, down around the south shore and up the west bank to a point opposite the said Boathouse. At that time, I netted several and placed them in my own outdoor pool.

- (5) BLUEGILL SUNFISH - Lepomis macrochirus (Rafinesque)

These are present in large numbers and openly visible over the gravel beds during the spawning period.

- (6) PUMPKINSEED SUNFISH - Lepomis gibbosus (Linnaeus)

These are also present in very large numbers and also quite visible to observation.

- (7) BROWN BULLHEAD CATFISH - Ictalurus nebulosus (LeSueur)

It is difficult to determine how large a population exists in the pond but they seem to favour the south-west corner near the marsh area where I have personally observed several spawnings.

- (8) YELLOW PERCH - Perca flavescens (Mitchill)

These seem to be most plentiful in the vicinity of the Boathouse on the eastern shore and seem to prefer that shoreline with its quantities of aquatic plant life to the plain gravel beds to the south around the horseshoe area.

- (9) BANDED KILLIFISH - Fundulus diaphanus (LeSueur)

This is a very interesting if diminutive fish and is the only member of the Genus Rivulus found in Canada. It would appear to be, in effect, the forage fish of Grenadier Pond and is seen around the same southerly horseshoe area as the Crappie. Other than the Brook Stickleback there are no other small species in the pond.

(10) BROOK STICKLEBACK - Culaea inconstans (Kirtland)

These occur in small numbers mostly in the large inlet at the south-east corner where there still exists some quantities of aquatic plant life.

(11) CARP - Cyprinus carpio Linnaeus

I have taken several young specimens of between $1\frac{1}{2}$ " to 3" at the very edge of the marsh area, south-west corner of the pond and also in the small channels running through that area between the Giant Sagittarias and Bulrushes. Although I have not personally observed any adults, I am informed by several of the Park officials of High Park that they have witnessed the spawning of adult specimens in the Spring on the eastern shore towards the south end in the large inlet.

Before closing this listing of fishes, I feel that mention should be made of Carassius auratus (Linnaeus), the Nisei Goldfish. In eight years of unbroken observation of Grenadier Pond, I have never seen any indication or sign of the existence in the pond of this particular species. However, a very large population of these fishes has existed for many years in the lower and largest of the duck ponds at the southeastern extremity of High Park and it is from that colony that the specimens to be displayed in the Canadian Government Pavilion at Expo '70, Osaka, Japan will be caught and selected. There is also a very considerable number of these fishes to be found just to the west of Grenadier Pond on the other side of Ellis Avenue in the Catfish Pond which drains into Grenadier. The drainage arrangement is so constructed however, as to preclude the possibility of any migration or even a stray immigrant reaching Grenadier Pond. It is interesting to note however, that these fishes are found in large numbers in ponds both to the east and to the west of Grenadier and raises the question as to whether there might possibly be a few inhabitants, courtesy of small boys, etc. and too few in numbers to be readily observable.

SUMMATION: - It will be seen from the above-listed species that the Ecology of Grenadier Pond is overwhelmingly of a carnivorous structure. I therefore doubt the advisability of attempting to implement the population with the introduction of members of the family Salmonidae, such as Salvelinus. Some thought has been recently given by certain officials of the Fisheries Section of the Ontario Department of Lands and Forests to the possibilities of making introductions of Trout to the pond with a view in mind to creating an opportunity for our local citizenry to enjoy the sporting benefits of fly-fishing without the necessity of travelling as far, for example, as the Caledon Hills to do so. Referring to my earlier comments on the presence in large numbers of the Black Crappie, otherwise known as the Calico Bass,