

# RESTORATION OF A WILDLIFE SANCTUARY IN AN URBAN SETTING<sup>1</sup>

by Peter F. Rice

**Abstract.** The Royal Botanical Gardens' Board has adopted a primary policy objective for Cootes Paradise: to manage the area as an urban wildlife sanctuary and to promote strategies that would sustain and enhance the diversity of the habitats. Under agreement with Ducks Unlimited Canada, Royal Botanical Gardens intends to undertake a project, the goal of which is to restore and manage a fully functioning marsh in nearly half of the wetland area (82 ha). This project is especially important because a rehabilitated marsh will be situated within an urban context. This poses unique challenges in developing appropriate management strategies to deal with both wildlife and the visiting public.

**Résumé.** Le comité du Royal Botanical Gardens a adopté un objectif de politique primaire pour le Cootes Paradise: aménager l'aire comme un sanctuaire urbain de vie sauvage et promouvoir des stratégies qui vont soutenir et relever la diversité des habitats. En harmonie avec Canards Illimités du Canada, le Royal Botanical Gardens projetait de se charger d'un projet, lequel a pour but de restaurer et d'aménager un marais pleinement fonctionnel sur la moitié approximativement des terres humides (82 ha). Le projet est spécialement important parce qu'un marais réhabilité peut être situé à l'intérieur du contexte urbain. Ceci pose des défis uniques dans le développement approprié de stratégies d'aménagement qui acceptent ensemble la vie sauvage et le public visiteur.

---

*I have never seen such a variety of wild fowl as come to this place. . It is therefore strongly recommended to ornithologists and sportsmen as a place above all others yet known in Canada most deserving of attention.*

*John MacTaggart, British Engineer, 1826*

Cootes Paradise is an 840 ha area of wetland and woodland at the northern limits of the Carolinian Life Zone situated at the very western end of Lake Ontario. It is part of the 1,000 ha of conservation lands now under the jurisdiction of the Royal Botanical Gardens, and is surrounded by an urban population of 500,000 people.

Cootes Paradise has been designated by the Province of Ontario as an Area of Natural and Scientific Interest and a Class 1 wetland, and an Environmentally Sensitive Area within the Regional Municipality of Hamilton-Wentworth. Historically it is recognized by the Canadian Wildlife Service as situated within the second

most important staging area for waterfowl on the Lake Ontario shoreline.

In 1975, the Board of the Gardens adopted a primary policy objective for Cootes Paradise: to manage the area as an urban wildlife sanctuary and to promote strategies that would sustain and enhance the diversity of habitats. Nevertheless, until recent years, efforts to fulfill this policy objective have not been sufficiently effective as changes in the biota have taken place at an increasingly alarming rate and the wildlife value of Cootes Paradise has diminished significantly. Though Cootes Paradise remains a sacred trust, much beloved by the tens of thousands of visitors it receives annually, it has become an unhealthy ecosystem.

This presentation outlines a major plan of restoration for nearly half the wetland portion of Cootes Paradise (190 ha).

## Background

The Wetland of Cootes Paradise, throughout its history until the early 1940s, was a thriving marshland replete with an abundance of emergent and submergent aquatic vegetation—the very essence of a marsh (Fig. 1). However, it has been in serious decline over the past 45 years as evidenced by the reduction of marsh vegetation communities which covered 85 percent of the wetland in 1934 to less than 15 percent today (Fig. 2). The principal reasons for the decline are three-fold. First, Spencer Creek, the main tributary at the eastern end of the wetland, has carried increased loadings of suspended solids and nutrients reflecting the rapid urbanization in the drainage basin since the Second World War. These sediments have been deposited in Cootes Paradise and in the Hamilton Harbour. Wind and wave action from the prevailing westerly winds resuspended the sediment. Second, carp, a warm-water fish species introduced from Europe, has come to dominate the fish population. The

---

1. Presented at the annual conference of the International Society of Arboriculture in Toronto, Ontario in August 1990.

feeding and breeding activities of carp during the summer also have served to resuspend the bottom sediments, creating such turbid conditions (Secchi disc—8 to 15 cm) that there is now insufficient light penetration to support growth of submergent aquatic macrophytes. Carp also have a direct affect on emergent vegetation as plants are physically uprooted in the search for food. Third, the littoral zone through much of the wetland is too scarce to support the growth of emergent marsh plants, and this, combined with unnatural, seasonal, water-level fluctuations (as a result of manipulation of water levels on the Great Lakes for navigational purposes), limit the plants' ability to expand from their current marginal locations.

Historically, the marsh vegetation receded and advanced, naturally, with the cyclical changes in water levels of Lake Ontario. However, because of the added factors now affecting the vegetation, it is apparent that the marsh is in irreversible decline—the loss of marsh habitat is permanent—without appropriate remediation, and an engineered solution is proposed.

On the other hand, the elements of a diverse ecosystem are still very much in evidence, though species diversity is now skewed toward large populations of a few species—an unbalanced system.

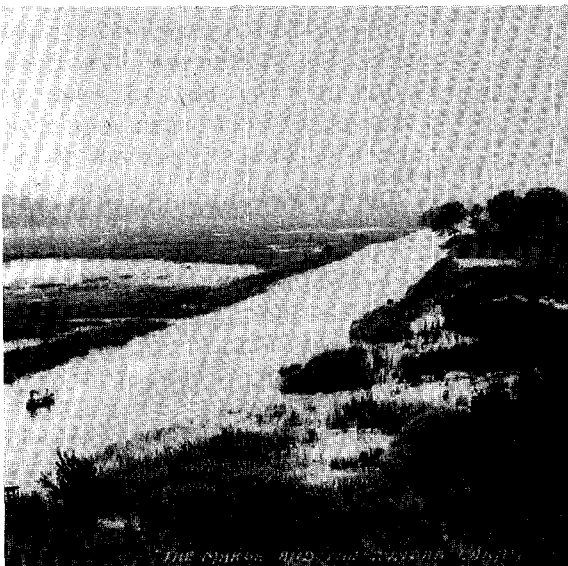


Figure 1. Cootes Paradise marsh as it appeared in 1925.

Several recent provincial, national and international initiatives have also served to focus attention on the biological importance of Cootes Paradise. These include the new North American Waterfowl Management Plan adopted jointly by Canada and the United States, an emerging wetland policy drafted by the government of Ontario to protect these diminishing resources and the Remedial Action Plan (RAP) for Hamilton Harbour.

The RAP is of particular significance here, since it is in the context of the RAP that RBG's plan of restoration has emanated. It has been developing for the past three years as a result of direction from the International Joint Commission to address water quality issues in the Areas of Concern around the Great Lakes, one of which is Hamilton Harbour. The RAP Stakeholders have taken an ecosystem approach toward improvement of water quality and in the definition of use-goals for the Harbour. One of the use goals is the enhancement of wildlife habitats in the Hamilton Harbour basin and marsh restoration in Cootes Paradise is an integral part of the RAP.

In addition, analyses of bottom sediments indicate relatively uncontaminated conditions, since heavy industry has been lacking in the watershed. It is also important to note that there has been a measurable reduction in nutrient loadings over the



Figure 2. From the same aspect as Figure 1, the wetland is now mostly devoid of aquatic vegetation.

past 14 years.

The encouraging biological data and the RAP process provided the impetus for RBG to take concrete action toward marsh restoration. In March, 1987, the Board of the Gardens, invited Ducks Unlimited Canada to undertake a biological and engineering study to determine the feasibility of re-establishing the marshland in Cootes Paradise. (Ducks Unlimited, Inc., is a private, non-profit, internationally-supported organization whose goals are to preserve, restore, develop and maintain waterfowl habitat. In the 50 years of its existence, it has contributed about \$350 million to Ducks Unlimited Canada which, in turn, has secured and developed 1.6 million ha of waterfowl habitat in Canada.)

In early 1988, Ducks Unlimited Canada reported back to RBG stating that its studies revealed the practicality of marsh rehabilitation for 82 ha, and further, that it was prepared to enter into a management agreement with RBG to undertake a major engineering project to reconstruct the marsh in this area.

A \$1.3 million project was proposed to the Gardens which adopted the project, as outlined below, subject to approvals from the appropriate regulatory agencies and the securing of funding. RBG is now in the process of seeking the required funds from private sources and has had some success in obtaining support from the regulatory agencies. The proposal has received widespread support from allied user groups, such as the

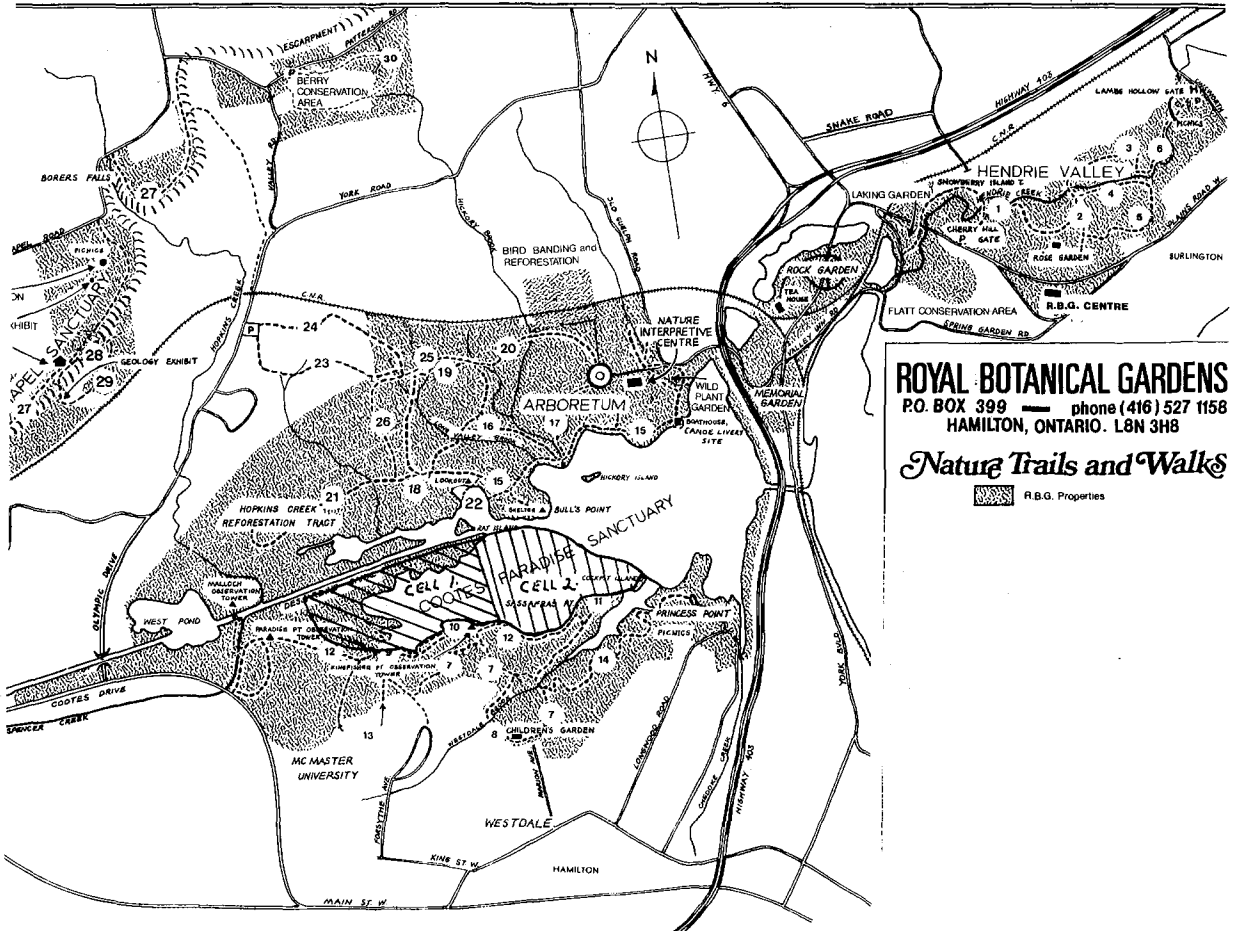


Figure 3. Map shows the location of proposed area for marsh restoration in Cootes Paradise. Two cells will be created behind low-level berms.

Hamilton Naturalists' Club and the public at large.

### **Project Goals and Objectives**

Therefore, under agreement with Ducks Unlimited Canada, Royal Botanical Gardens intends to undertake this project, the goal of which is to restore and manage a fully functioning marsh in nearly half of the wetland area (82 ha).

The *objectives* of project are as follows:

1. to fulfill the potential of Cootes Paradise as a more significant contributor to the vitality of North America's fauna.
2. to create a diversity of habitats for as large a variety of wetland-dependent flora and fauna as possible.
3. to open up opportunities for the re-introduction of native species (Carolinian, particularly), which have been extirpated from the region.
4. to provide controlled opportunities for a largely urban population to experience a viable marshland—with appropriate interpretation.
5. to create a stable managed marsh environment for ecological research.
6. to make a major contribution toward fulfilling the use goals of the Remedial Action Plan for Hamilton Harbour.

### **Project Implementation**

The project will involve the impoundment of the western portion of the Cootes Paradise wetland behind berms or dikes the alignments of which are shown in Fig. 3. There will be two impoundments or cells each of which will be about 40 ha and the total managed areas will be nearly 50 percent of the wetland. The impoundments are so located within the wetland as to isolate the natural drainage channels and retain the integrity of the historic Desjardins Canal. The majority of the berming will be constructed of material dredged by dragline from areas adjacent to the berm. In cross-section, the completed berms will be broadly trapezoid with 3:1 slopes and the top three to four metres wide. They will be about two metres high, rising about 60 cm above water level.

Three water-level control structures will be installed in the berms near the juncture of the two cells. A mobile, silenced, diesel (or gasoline) pump will also be located there.

The construction phase will take place over nine months beginning in the autumn months. The

dikes themselves are anticipated to be in place by early spring to minimize disruption to fish populations. During the winter the western portion of the wetland normally freezes to the bottom and for this reason, the fish, including carp, move out of this region in the late autumn.

The exact timing of the project is not yet determined because there are some matters yet to be resolved. For instance the project, as proposed, will exclude all fish, not just carp (Though 38 fish species have been found in Cootes Paradise, 80% of the fish biomass is carp). In order to comply with Canada's Fisheries Act (no net loss of fish habitat), it is appropriate to include a fisheries component that specifically encourages nursery and spawning use by species non-destructive to vegetation (e.g. pike and large-mouth bass) to the exclusion of destructive species. Therefore a fisheries component must involve selective passage of desirable species in and out of the impounded wetland. Whether there are practical technologies that could be applied to achieve selective fish passage is not yet known.

### **Management Strategies**

Initially complete drawdown of the impoundments will occur allowing for oxidation and consolidation of the bottom sediment, releasing of mineral nutrients and fostering seed germination. By excluding carp and minimizing resuspension of solids, turbidity will be mostly eliminated, permitting the re-establishment of vegetation from the residual seed bank. Similarly, exerting control over water levels will allow emergent vegetation to recolonize. Cells will be gradually reflooded and water levels subsequently adjusted to attain the desirable open water to plant cover ratio (1:1) and species composition. The exposed portions of the dikes will be seeded with types of vegetation that will secure soil stability and discourage nesting and grazing by Canada Geese.

Management will concentrate on increasing the use by waterfowl, shore-birds, and other wetland-dependent species, particularly during migratory periods. Species manipulation will be kept to a minimum. Relocation and reintroduction of species that have been extirpated due to habitat loss will be attempted. Monitoring of drawdown and reflooding effects *vis a vis* water quality, benthic invertebrate populations and vegetational

response will occur at regular intervals and wildlife reconnaissance, systematic breeding bird surveys and bird-banding will be similarly undertaken.

Public access to dikes will be limited to the non-breeding season through the use of security patrols, fenced access points, signage and strategically placed viewing towers and blinds. Throughout Cootes Paradise, public use will be restricted to the currently permitted, passive, recreational pursuits—principally natural history appreciation. No boating will be allowed within the impoundments.

### Benefits of the Project

The significant values of marshlands to wildlife need not be elaborated upon here—these are self-evident. With the exclusion of carp from the cells, water clarity will improve to the point where aquatic vegetation will return naturally, and with it, the wetland-dependent fauna in greater diversity and numbers. A better balanced, largely self-sustaining ecosystem will be restored.

Because the dikes and the emergent marsh will reduce the effects of the prevailing westerly wind on resuspension of bottom sediments, the quality of water will improve in the wetland as a whole and the suspended solid loading in Hamilton Harbour is expected to be lessened.

What makes this project especially important is the redevelopment of a marsh of significant size, strategically located in a region of Ontario where viable wetlands have largely disappeared. In addition, for the first time in Canada, a rehabilitated marsh will be situated within an urban context. This poses unique challenges in developing appropriate management strategies to deal with both wildlife and the visiting public, and offers an abun-

dance of opportunities for biological research in a stable marsh environment within an urban setting. The wetland will return, at least in part, to the "paradise" it once was!

### References

- Dennis, D.G. and R.E. Chandler. 1974. *Waterfowl use of the Ontario Shorelines of the Southern Great Lakes during migration*. In: *Waterfowl Studies 1974*. H. Boyd (ed.) C.W.S. Tech Re. #29, 106pp.
- Dennis, D.G. et al. 1984. *An updated assessment of migrant waterfowl use of the Ontario shorelines of the Southern Great Lakes*. In: *Waterfowl Studies in Ontario. 1973-81*. C.W.G. occas. paper #54, 71pp.
- Dobos, R.Z. 1986. *Preliminary compilation of data on historical changes in waterbird populations associated with Burlington Bay, Lake Ontario*. C.W.S. unpublished rep.
- Harris, G.P. and H.M. Baccus. 1974. *Chlorophyll and production in a polytropic marsh*. Proc. 9th Canadian Symp. Water Poll. Ref. Canada: 121-134.
- McLarty, A.W. and A.G. Thachuk. 1986. *Cootes Paradise Study*. Tech. Rep. OMOE: 47pp.
- Painter, D.S., W.L. Simser and K. McCabe. 1988. *Past and Present Limnological Conditions in Cootes Paradise affecting Vegetation*. (in publication) 833pp.
- Pomfret, B. 1988. *Waterbird Usage of Cootes Paradise and Surround Area during the Spring and Summer of 1988*. Unpublished rep. 33pp.
- Rodgers, K. (co-ordinator). 1988. *Remedial Action Plan for Hamilton Harbour. Goals, Problems and Options Discussion Document*. 200pp.
- Semkin, R.G., A.W. McLarty, D. Craig. 1976. *A Water Quality Study of Coots Paradise*. Tech. Rep. OMOE: 83pp.
- Simser, W.L. 1981. *Changes in the Aquatic Biota of Cootes Paradise Marsh*. Tech. Bull. #12. Royal Bot. Gardens: 14pp.
- Simser, W.L. (ed). 1985. *RBG Natural Areas Baseline Studies*. unpublished rep. (internal working document).
- United States Dept. of the Interior and Environment Canada. 1986. *The North American Waterfowl Management Plan*. C.W.S. publication Cat. No. CWW66-80/1986 E. 19pp.

*Royal Botanical Gardens*  
Box 399  
Hamilton, Ontario L8N 3H8  
CANADA