

## Plant Species

### Emergent Species

American Bulrush  
Blueflag Iris  
Broad-leaved Cattail  
Broad-leaved Arrowhead  
Common Reed  
Lakebank Sedge  
Giant Burreed  
Hardstem Bulrush  
Narrow-leaved Cattail  
Narrow-leaved Arrowhead  
Pickerel Weed  
River Bulrush  
Prairie Cordgrass  
Softstem Bulrush  
Southern Wild Rice  
Sweetflag  
Water Arum  
Watercress  
Water Plantain  
Water Smartweed  
Water Willow  
Yellow Iris

### Submergent Species

Brittle Naiad  
Common Bladderwort  
Canada Waterweed  
Coontail  
Curly-leaved Pondweed  
Eurasian Milfoil  
Flat stemmed Pondweed  
Floating-leaved Pondweed  
Horned Pondweed  
Leafy Pondweed  
Long-leaf Pondweed  
Sago Pondweed  
Wild Celery

### Floating Leaf

Greater Duckweed  
Lesser Duckweed  
Star Duckweed  
White Water lily  
Yellow Water Lily



## Quick Facts

Two Wetland Systems, Cootes Paradise and Grindstone Marsh

Total Wetland Area: 410 hectares

Total Shoreline: ~30km

### Most Common Species

Plant: Leafy Pondweed

Amphibian: Green Frog

Fish: Brown Bullhead

Bird: Red-winged Blackbird

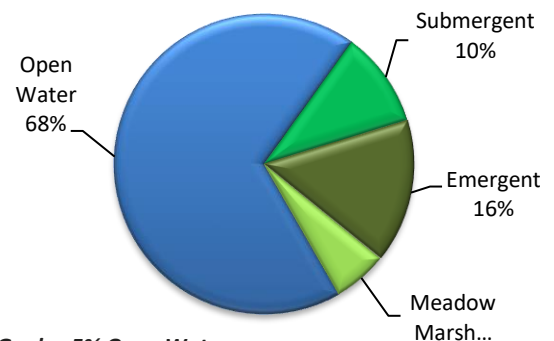
## Wetland Restoration Progress

By 1990 virtually all submergent and emergent plants were lost from Cootes Paradise and Grindstone Marsh, the water was hypereutrophic and muddy and the ecosystems had collapsed. A century of inflowing sewage, watershed erosion and invasive species had destroyed the two coastal marshes of the Royal Botanical Gardens Nature Reserves. As part of a Remedial Action Plan (started 1985) both of these wetlands are improving, but are still degraded. The first project was implemented onsite in 1994 in Grindstone Marsh, although most projects occur upstream of RBG.

2018 found a decreased plant area with only pockets of restored habitat and clear water found in each wetland. Total wetland vegetation area in 1990 was 38 hectares (mostly meadow marsh) and was 95 hectares in 2018. Water quality trends were dramatically impacted in Cootes Paradise by a sewage spill in a tributary (Chedoke Creek). Average water quality was very degraded and highly eutrophic as measured by water column sediment and phosphorus. With the pockets of improving habitat some amphibians have

returned, wetland bird numbers overall decreased with the impaired habitat, while spawning runs of several fish species have increased. Fishway spawning runs from Lake Ontario in 1997 totaled 3,199 fish and 18 species, while in 2018 totaled 22,104 fish and 14 species. All fish populations remain well below historical levels (once in the 100,000s). Common Carp densities in 2018 were higher than the 2014 low due to 2017 flooding and were problematic. Major water quality projects to complete are upgrades to the Dundas Waste Water Treatment Plant, trackdown of other urban sewage sources, and improved urban runoff following rain events.

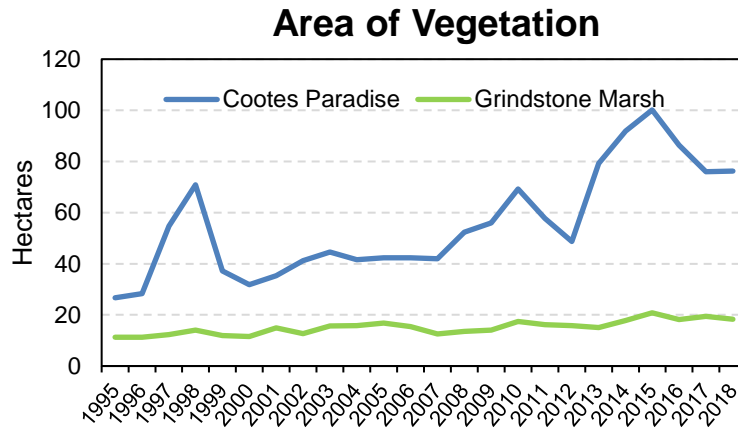
## 2018 Wetland Habitat Areas



Goal < 5% Open Water  
2018 Water Clarity – 28 cm

# Marsh Vegetation Trends

In a healthy marsh, water level fluctuations create the pattern of submergent and emergent plants. However, in Cootes Paradise Marsh until 1997 and carp exclusion via the Fishway at the marsh outlet, only the occasional submergent plant remained and emergent plants were reduced to above the average summer water line. Grindstone Marsh was only in slightly better condition, with submergent plants and water lily patches found only in the outer marsh (Carroll's Bay). Cootes Paradise Marsh submergent plants were increasing between 1997 & 2015, with challenges due to ongoing intense algae blooms overwhelming the plants due to an overload of nutrient inflow. Currently 9 species are found and 25 hectares of submergent plants have returned. The common species change over the season. In spring a



pondweed (*P. foliosus*), is dominant, while later in the season it is replaced by Brittle Naiad (*Najas minor*). White water lilies (*Nymphaea odorata*) increase annually, covering 4% of the marsh in 2018. Its recovery is boosted by plantings, as is Wild Rice (*Zizania aquatica*) a species once totally lost. While also on the rise, it was reduced to less than 12 plants in 2018. In the carp excluded areas of Grindstone Marsh submergent plants fill the wetland areas. White Water Lily dominates,

with 11 plant species present. In 2018 several areas were flooded and impaired by carp. In Carroll's Bay were carp are not excluded all but small patches of yellow water lily (*Nuphar variegatum*) have been lost. In the protected areas emergent plants have annually increased and are dominated by cattails (*Typha sp.*). A substantial increase occurred in 1999 when lower water left hectares of the marsh bottom exposed germinating a mix of seedling establishing patches of reeds.

## Remedial Action Plan

The Remedial Action Plan (RAP) is a plan to delist Hamilton Harbour from a list of 43 Areas of Concern (AOCs). Hamilton was designated as an AOC in 1987 under the Canada-United States Great Lakes Water Quality Agreement. This promotes bi-national consultation and cooperative action to restore, protect, and enhance the water quality of the Great Lakes Basin. The GLWQA recognizes the importance of the Great Lakes to the social, environmental health and economic livelihood of both countries. In order to address issues facing the Great Lakes, the partners work to find solutions to past damages and limit future threats to the waterways. Through recognizing the entirety of the ecosystem, actions can be undertaken sustainably. Work on defining the "State of the Harbour" was first initiated in 1985, and remedial action was initiated in 1992. Locally the Bay Area Implementation Team (BAIT), a group of 15 area agencies reviews information and directs the remedial actions in five year work plans. Completion dates for all actions is undetermined dated by

## Wetland Recovery Targets and Status

Measure	Location	Objective	1995 Averages	2018 Averages
Vegetated Area	Cootes Paradise	230 ha	26.59 ha	76.3 ha
	Grindstone Marsh	40 ha	11.26 ha	18.2 ha
Water Clarity	Cootes Paradise	> 100 cm	< 30 cm	29 cm
	Grindstone Marsh			27 cm
Total Phosphorus	Cootes Paradise	< 30 µg/L	270 µg/L	202 µg/L
	Grindstone Marsh			168 µg/L
Total Suspended Sediment	Cootes Paradise	< 25 mg/L	65 mg/L	43 mg/L
	Grindstone Marsh			35 mg/L
E. coli	Cootes Paradise	< 200 coliforms/100 mL	> 10,000 coliforms/100 mL	440 /100 mL
	Grindstone Marsh			124 /100 mL
Water Cycle	Cootes Paradise	Natural Pattern	Plan 1958DD	Plan 2014
	Grindstone Marsh			Flooding deviations
Carp Density	Cootes Paradise	< 20 kg/ha	800 kg/ha	30 kg/ha
	Grindstone Marsh			20-150 kg/ha