Monitoring Catalogue

2005

Hamilton Harbour Remedial Action Plan
Hamilton Harbour Remedial Action Plan
Monitoring Catalogue
2005

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RAP Researcher/Report Writer: Kristin M. O'Connor

January 2006
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Hamilton Harbour Remedial Action Plan
Monitoring Catalogue: 2005

1. Background

In the late 1980s, the International Joint Commission (IJC) identified 43 Areas of Concern in the Great Lakes basin where the beneficial uses of the water were considered impaired. Hamilton Harbour was identified as one of 17 Canadian Areas of Concern. Annex 2 of the Great Lakes Water Quality Agreement (GLWQA) (1978 – as amended 1987) identifies the 14 impaired beneficial uses as:

i. Restriction on fish and wildlife consumption
ii. Tainting of fish and wildlife flavour
iii. Degraded fish and wildlife populations
iv. Fish tumours or other deformities
v. Bird or animal deformities or reproductive problems
vi. Degradation of benthos
vii. Restrictions on dredging activities
viii. Eutrophication or undesirable algae
ix. Restrictions on drinking water consumption or taste and odour problems
x. Beach closings (Water contact sports)
xi. Degradation of aesthetics
xii. Added cost to agriculture or industry
xiii. Degradation of phytoplankton and zooplankton populations
xiv. Loss of fish and wildlife habitat

The Remedial Action Plan (RAP) program under the GLWQA is an initiative that requires the Canadian and U.S. governments to develop plans explaining how the problems in each of the Areas of Concern will be addressed. There are three stages to be addressed in Remedial Action Plans:

Stage 1 – Environmental Conditions and Problem Definition
Stage 2 – Goals, Options and Recommendations
Stage 3 – Evaluation of Remedial Measures and Confirmation of Restoration of Uses

For the Hamilton Harbour Area of Concern (AOC), Stage 1 was completed in 1989 with a second edition produced in 1992. Stage 2 was completed in 1992, with an update in 2002. Stage 3, currently targeted for 2015, will not be written until Hamilton Harbour is ready to apply to be delisted as an AOC.

The Hamilton Harbour RAP is assisted by: the Bay Area Implementation Team (BAIT), the Bay Area Restoration Council (BARC), and Hamilton Harbour scientists. The Hamilton Harbour RAP relies on BAIT for implementation of initiatives, BARC for public input, and scientists for ongoing scientific and technical advice. The contributions from these groups cannot be understated. The Hamilton Harbour RAP has met the expectations of the public-at-large and incorporated an ecosystem approach because of these organizations.
2. **Description of the Area**

Hamilton Harbour is a 2,150 hectare (ha) embayment of Lake Ontario connected to the lake by a single ship canal across the sandbar that forms the bay. The conditions in the Harbour reflect natural inputs, human activities, land uses, and drainage from the watershed of 49,400 ha (Figure 1). Cootes Paradise Marsh is a 250 ha, shallow area of both marsh and open water, discharging at an artificial opening into the west end of the Harbour called the Desjardins Canal.

![Figure 1. Hamilton Harbour Watershed](image)

3. **RAP Components**

The Stage 2 Update 2002 divides the Hamilton Harbour RAP into seven components:

- Water Quality and Bacterial Contamination
- Urbanization and Land Management
- Toxic Substances and Sediment Remediation
- Fish and Wildlife
- Public Access and Aesthetics
- Education and Public Information
- Research and Monitoring
4. Research and Monitoring Plan

The Research and Monitoring Plan for the RAP is laid out in Chapter VIII of the Stage 2 Update 2002. Implementing agencies were surveyed to submit a list of the monitoring programs their organization performed each year in Hamilton Harbour and its surrounding watershed. Basic information included: who is in the lead of the monitoring, where the monitoring takes place, what is being monitored, and how often monitoring takes place.

This plan served as the starting point for developing this monitoring catalogue. As monitoring programs not listed in the plan came to the attention of the RAP Office, they were subsequently contacted.

If there are any monitoring programs that have been missed, please bring them to the attention of the RAP Office so they can be included in future editions of this catalogue.

5. Purpose of a Monitoring Catalogue

This monitoring catalogue has been developed to compile metadata information on monitoring activities occurring throughout Hamilton Harbour in one report. It will help broaden our understanding of what monitoring is happening and identify potential gaps. It has been designed to be reviewed and updated on an annual basis.

Research vs monitoring. Frequently, these two activities are lumped together as they are closely related; however, there is a difference between the two activities. Research is a short term, intensive effort that examines a defined question to make a conclusion. Monitoring is a long term effort that requires data sets to be consistently collected over an extended period of time to examine trends. Continuing research and development is needed to parallel the routine monitoring. This is important to enable the RAP to deal with new issues and problems as they arise, and to facilitate the regular review and interpretation of the monitoring data.

The audience for this report includes: the RAP Technical Team, the Bay Area Implementation Team (BAIT), the Bay Area Restoration Council (BARC), researchers, and the general public.

A key use for this report is to analyze the progress towards delisting Hamilton Harbour as an AOC by the target date of 2015. Hamilton Harbour RAP has set out 14 delisting objectives patterned on the IJC’s beneficial use impairments. The Stage 3 report (Evaluation of Remedial Measures and Confirmation of Restoration of Uses) will require many data sets of long term monitoring information on the delisting objectives to make a case to the IJC for delisting Hamilton Harbour.

BARC’s Monitoring Committee is using information collected for this catalogue as a starting point for their Towards Safe Harbours reports for 2004, 2005, and 2006. These reports will “examine the research and monitoring activities in the harbour and its watershed, and assess what needs to be done. In 2004 the report will focus on fish and wildlife objectives. The 2005 will focus on the topic of water quality, while the 2006 report will centre its attention on toxic substances and sediment remediation.” (pg 4, BARC – Toward Safe Harbours: Progress Toward Delisting – Work Plan, April 2003)
6. **Annual Workshops**

The Hamilton Harbour RAP addresses the need for research and monitoring information to be presented to others in the RAP on a regular basis through a series of three annual workshops. The RAP Technical Team hosts a Harbour Research and Monitoring Workshop each winter, since 2001. The Royal Botanical Gardens hosts a Project Paradise Field Season Review, on the previous year’s work in Cootes Paradise and Grindstone Creek, each winter, since 1994. The two local Conservation Authorities, Hamilton Conservation Authority and Conservation Halton, began to host their own annual workshop series in the fall of 2003 with the Watershed Monitoring and Research Workshop.

7. **Catalogue Form Questions**

The following metadata information was asked of each individual/agency responsible for monitoring programs in Hamilton Harbour:

- Official Title of Monitoring Program
- Name of Organization
- Description (what is being monitored)
- Sampling Protocol (e.g. number of samples, depth of sample, etc.)
- Sampling Parameters
- Rationale (RAP Recommendation, Delisting Objective, Regulatory Requirement)
- Frequency of Monitoring
- Next Monitoring Period
- Location of Sites (maps provided when available)
- List Year(s) for which Data was Collected
- Data Available to the Public Through Contact Person (yes/no)
- Trend Analysis Prepared (yes/no)
- Brief Description of Results and Discussion
- Publication Prepared (yes/no)
- Copy to RAP Office (yes/no)
- Publications
- Future Monitoring – Identify any known programs that are in the development stage or should be considered to answer emerging issues
- Data Contact Person information

8. **Catalogue Form Responses**

All of the forms returned to the RAP Office follow, grouped by agency.
**Central Station Water Quality Monitoring**

**OFFICIAL TITLE OF MONITORING PROGRAM**

Central Station Water Quality Monitoring

**NAME OF ORGANIZATION**

Environment Canada – National Water Research Institute

**DESCRIPTION: (WHAT IS BEING MONITORED)**

water quality

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

Van Dorn water sampling bottle, electronic profiler for oxygen, temperature and conductivity, water samples analyzed at NWRI

**SAMPLING PARAMETERS (LIST)**

phosphorus, oxygen, ammonia, nitrate, nitrite, chlorophyll, Secchi transparency, temperature profiles, zooplankton, phytoplankton, algal toxins, zebra mussel veligers, coliforms, E.Coli at beaches

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation WQ-1a, WQ-1e
- Delisting Objective viii, xiii
- Regulatory Requirement
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Weekly from May – October

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

2006

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached

Station 52 (central station) and at 23 more stations several times/year in intense research years

**LIST YEARS FOR WHICH DATA WAS COLLECTED**

1987 - 2005

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- YES
- NO

**TREND ANALYSIS PREPARED**

- YES
- NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

Harbour nutrient conditions have improved due to optimization at Skyway WWTP. Study hopes to document changes due to improvements at Woodward WWTP. General water quality parameters are often better than initial goals but sometimes worse. Occasional toxic blue green algal blooms occur. Beaches seem to be closed due to bird fecal material. Overall bacterial numbers are often low in the Harbour generally.

**PUBLICATIONS PREPARED**

- YES
- NO

**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

**DATA CONTACT PERSON**

**NAME**

Murray Charlton

**POSITION**

Research Scientist

**DEPARTMENT/DIVISION**

NWRI (National Water Research Institute)

**AGENCY**

Environment Canada

**EMAIL**

Murray.Charlton@ec.gc.ca

**TELEPHONE**

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**FAX**

905-336-6430

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867 Lakeshore Road, PO Box 5050

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Burlington

**PROVINCE**

Ontario

**POSTAL CODE**

L7R 4A6

**META DATA LAST UPDATED (YYYY-MM)**

2005-08

**FIRST INCLUDED IN CATALOGUE**

June 2004 – 1st Edition
OFFICIAL TITLE OF MONITORING PROGRAM

**Hamilton Harbour Spring Water Quality Monitoring**

NAME OF ORGANIZATION

Environment Canada – National Water Research Institute

DESCRIPTION: (WHAT IS BEING MONITORED)

water quality

SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)

SAMPLING PARAMETERS (LIST)

nutrients, major ions, physical measurements (including EBT profile surface to bottom, DO, pH, temp), organic contaminants (OCs, PCBs, PAHs, CBs), total metals

RATIONALE (LIST NUMBER(S) IF APPLICABLE)

☐ RAP Recommendation WQ-1a ☐ Regulatory Requirement

☐ Delisting Objective viii ☐ Other - Identify/Describe

FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)

1 time/year (spring)

NEXT MONITORING PERIOD (IDENTIFY YEAR)

2006

LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE

☐ Map Attached 4 Stations (50, 51, 52, 53)

LIST YEAR(S) FOR WHICH DATA WAS COLLECTED

DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON

☐ YES ☐ NO IF NO PLEASE EXPLAIN

DATA FORMAT (SPREADSHEET, DATABASE, etc)

TREND ANALYSIS PREPARED

☐ YES ☐ NO

BRIEFLY DESCRIBE RESULTS AND DISCUSSION

PUBLICATIONS PREPARED

☐ YES ☐ NO

COPY TO RAP OFFICE

☐ YES ☐ NO

PUBLICATIONS

FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES

DATA CONTACT PERSON

NAME

Murray Charlton

POSITION

Research Scientist

DEPARTMENT/DIVISION

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AGENCY

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POSTAL CODE

L7R 4A6

METADATA LAST UPDATED (YYYY-MM)

2005-08

FIRST INCLUDED IN CATALOGUE

June 2004 – 1st Edition
### Hamilton Harbour Summer Water Quality Monitoring

**OFFICIAL TITLE OF MONITORING PROGRAM**

Hamilton Harbour Summer Water Quality Monitoring

**NAME OF ORGANIZATION**

Environment Canada – National Water Research Institute

**DESCRIPTION (WHAT IS BEING MONITORED)**

water quality

**SAMPLING PROTOCOL (E.G., NUMBER OF SAMPLES, DEPTH OF SAMPLE, ETC.)**

nutrients, major ions, physical measurements (including EBT profile surface to bottom, DO, pH, temp), total mercury

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation WQ-1a
- Delisting Objective viii
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

1 time/year (end summer)

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

2004

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached 4 Stations (50, 51, 52, 53)

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

YES 

**DATA FORMAT (SPREADSHEET, DATABASE, ETC.)**

- YES
- NO

**TREND ANALYSIS PREPARED**

- YES
- NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

- YES
- NO

**PUBLICATIONS PREPARED**

- YES
- NO

**COPY TO RAP OFFICE**

- YES
- NO

**PUBLICATIONS**

- YES
- NO

**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

**DATA CONTACT PERSON**

<table>
<thead>
<tr>
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<th>POSITION</th>
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<tbody>
<tr>
<td>Murray Charlton</td>
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**METADATA LAST UPDATED (YYYY-MM)**

2005-08

**FIRST INCLUDED IN CATALOGUE**

June 2004 – 1st Edition
# Persistent Organic Pollutants in the Great Lakes and Associated Areas of Concern

**OFFICIAL TITLE OF MONITORING PROGRAM**

Persistent Organic Pollutants in the Great Lakes and Associated Areas of Concern

**NAME OF ORGANIZATION**

Environment Canada – National Water Research Institute

**DESCRIPTION (WHAT IS BEING MONITORED)**

suspended sediment

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

Sediment traps deployed and refurbished monthly during field season (April to November). Deployment sites correspond to NWRI index stations in the western area of the harbour (influenced by inflow from Cootes), northeastern area (influenced by Burlington STP outfall and Indian Creek), central area (deep-water depositional area), at the Windermere Basin bridge, and at the outflow of Windermere Arm to the open harbour.

**SAMPLING PARAMETERS (LIST)**

PCBs, dioxins and furans, pesticides (organochlorine and current-use), PAHs, new organic pollutants, mercury, metals

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation TSSR-3
- Delisting Objective viii

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Monthly from May – November

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

2005

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached 6 Stations (50, 51, 52, 53, 2 stations at Randle Reef)

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- YES
- NO

**DATA FORMAT (SPREADSHEET, DATABASE, etc)**

- YES
- NO

**TREND ANALYSIS PREPARED**

- YES
- NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

Temporal trends in PCBs and PAHs in Hamilton Harbour have been established over the period 1988 – 2003. There were dramatic declines in contaminant concentrations over the period 1988 – 1992. Trends since the mid-1990s have been more difficult to distinguish. However, levels of PAHs and PCBs for 2003 were the lowest yet recorded for these samples. The overall downward trend has been attributed to implementation of RAP recommendations for reducing discharges of toxics, improvements in industrial processes, and increased stakeholder stewardship. However, the harbour by its nature continues to be subject to significant contaminant loadings, and future efforts will focus on source control. Two additional sites have been established in 2005 in the area of Randle Reef for assessment of suspended sediment quality during implementation and post-remediation stages of the cleanup of contaminated sediment in this area.

**PUBLICATIONS PREPARED**

- YES
- NO

**COPY TO RAP OFFICE**

- YES
- NO

**PUBLICATIONS**

**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

**DATA CONTACT PERSON**

Dr. Chris Marvin  
Position: Research Scientist  
Agency: NWRI - AEMRB  
Environment Canada

- **Email**: Chris.Marvin@ec.gc.ca  
- **Telephone**: 905-319-6919  
- **Fax**: 905-336-6430  
- **Address**: 867 Lakeshore Road, PO Box 5050, Burlington, Ontario L7R 4A6
<table>
<thead>
<tr>
<th>OFFICIAL TITLE OF MONITORING PROGRAM</th>
<th>Hamilton Harbour Colonial Waterbird Counts</th>
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<tbody>
<tr>
<td>NAME OF ORGANIZATION</td>
<td>Environment Canada – Canadian Wildlife Service [ECB-CSD (CWS)]</td>
</tr>
<tr>
<td>DESCRIPTION (WHAT IS BEING MONITORED)</td>
<td>To monitor colony location and nesting populations of colonial waterbirds (Herring and Ring-billed Gulls, Double-crested Cormorants, Common and Caspian Terns, Black-crowned Night Herons) that nest at various sites within Hamilton Harbour.</td>
</tr>
<tr>
<td>SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)</td>
<td>Ground counts of AON (apparently occupied nests) are performed at various times (depending on the species) in the spring at the different colony locations.</td>
</tr>
<tr>
<td>SAMPLING PARAMETERS (LIST)</td>
<td>Number of apparently occupied nests</td>
</tr>
<tr>
<td>RATIONALE (LIST NUMBER(S) IF APPLICABLE)</td>
<td>☒ RAP Recommendation  RM-1  ☐ Regulatory Requirement  ☒ Delisting Objective  iii  ☐ Other - Identify/Describe To track population changes relative to waterbird management</td>
</tr>
<tr>
<td>FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)</td>
<td>Spring - once per year</td>
</tr>
<tr>
<td>NEXT MONITORING PERIOD (IDENTIFY YEAR)</td>
<td>2006</td>
</tr>
<tr>
<td>LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE</td>
<td>Map Attached  Various</td>
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<td>DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON</td>
<td>YES  ☐</td>
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<td>DATA FORMAT (SPREADSHEET, DATABASE, etc)</td>
<td>YES  ☐</td>
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<tr>
<td>TREND ANALYSIS PREPARED</td>
<td>YES  ☐</td>
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**Results of trend analysis (1997-2003) indicate that the number of Ring-billed Gulls has been increasing significantly on the wildlife islands. This means that more Ring-billed Gulls are nesting on the wildlife islands each year. This, in turn, may mean that it could be increasingly difficult to maintain the species with which Ring-billed Gulls compete for nest space, most notably Common Terns but possibly Caspian Terns in some cases. The number of Double-crested Cormorants has been increasing significantly in Hamilton. This means that although the number of nesting cormorants on the wildlife islands appears to be limited by the number of “artificial trees” placed there, their numbers are increasing elsewhere in the Harbour. Non-significant trends suggest that there is a negative trend for Black-crowned Night-Herons, Caspian Terns and Common Terns on the wildlife islands, indicating their numbers may already be declining on the islands. Over the coming winter and the next season or two, this possible pattern should be assessed in more detail and future management actions discussed. Needless to say, continued monitoring of the situation is essential for these species. For Caspian and Common Terns, analysis also shows (non-significant) negative trend for number of nests throughout the Harbour.**

| PUBLICATIONS PREPARED | YES  ☐ |
| COPY TO RAP OFFICE | YES  ☐ |


FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES
Currently plan to continue monitoring nesting populations every 1-2 years. Organization and planning of monitoring can conflict with other research projects elsewhere on the Great Lakes. Collaboration and assistance of Hamilton Harbour RAP would be of great assistance in this regard.

DATA CONTACT PERSON

<table>
<thead>
<tr>
<th>NAME</th>
<th>POSITION</th>
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<tbody>
<tr>
<td>Dr. D.V. Chip Weseloh</td>
<td>Wildlife Toxicologist</td>
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<th>DEPARTMENT/DIVISION</th>
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<tr>
<td>Canadian Wildlife Service</td>
<td>Environment Canada</td>
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<td>416-739-5846</td>
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<tr>
<td>4905 Dufferin Street</td>
<td>Downsview</td>
<td>Ontario</td>
<td>M3H 5T4</td>
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METADATA LAST UPDATED (YYYY-MM)  FIRST INCLUDED IN CATALOGUE
2006-01                      June 2004 – 1st Edition

Sampling locations are approximate
**OFFICIAL TITLE OF MONITORING PROGRAM**

**Great Lakes Herring Gull Egg Contaminants: Annual Monitoring**

**NAME OF ORGANIZATION**

Environment Canada – Canadian Wildlife Service [ECB-CSD (CWS)]

**DESCRIPTION (WHAT IS BEING MONITORED)**

To monitor spatial and temporal trends in contaminants and their effects in wildlife (Herring Gulls) on the Great Lakes.

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

Thirteen fresh Herring Gull eggs are collected randomly (one per nest) from Herring Gull nests in Hamilton Harbour. This usually occurs between 24 April and 6 May; freshness of the eggs is confirmed through egg flotation at each site, if necessary. Eggs are placed in a cushioned carton, refrigerated within 48 hrs at 5°C and sent to NWRC for processing usually within four weeks. Clutch volumes are derived from length and width measurements of all three eggs in a clutch; the same clutch as that from which the sample egg is taken. Analytical results are entered into a database and change-point regression analysis (to determine temporal trends and changes in rates of decline) is conducted through a program in Wildspace.

**SAMPLING PARAMETERS (LIST)**

- OC / PCBs
- non-ortho PCBs
- Dioxins / Furans
- mercury

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation FW-6, RM-2
- Delisting Objective
- Regulatory Requirement
- Other - Identify/Describe
- Annual monitoring has occurred at colonies throughout the Great Lakes since 1974 (Hamilton was included beginning in 1981)

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Spring - once per year

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

2006

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

- Map Attached
- Eastport Drive, 43 16'42" 79 47'24" and Northeast Shoreline Islands, 43 18'30" 79 48'18"

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**


**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- YES
- NO

**DATA FORMAT (SPREADSHEET, DATABASE, etc)**

- YES
- NO

**TREND ANALYSIS PREPARED**

- YES
- NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

See papers.

**PUBLICATIONS PREPARED**

- YES
- NO

**COPY TO RAP OFFICE**

- YES
- NO

**PUBLICATIONS**


FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES
Current annual monitoring will be maintained.

DATA CONTACT PERSON

<table>
<thead>
<tr>
<th>NAME</th>
<th>Dr. Chip Weseloh</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSITION</td>
<td>Wildlife Toxicologist</td>
</tr>
<tr>
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<tr>
<td>EMAIL</td>
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<tr>
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<td>416-739-5846</td>
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<tr>
<td>ADDRESS</td>
<td>4905 Dufferin Street</td>
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Sampling locations are approximate
**OFFICIAL TITLE OF MONITORING PROGRAM**

**Assessing the Health of Snapping Turtles in Selected AOCs of the Great Lakes (Ontario Region)**

**NAME OF ORGANIZATION**

Environment Canada – Canadian Wildlife Service [ECB-CSD (CWS)]

**DESCRIPTION (WHAT IS BEING MONITORED)**

To monitor spatial and temporal trends in contaminants and to assess the health of juvenile and adult Snapping Turtles in selected Canadian Areas of Concern on the Great Lakes.

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

Adult turtles are live-trapped, individually identified, and blood-sampled. Fresh eggs are collected from turtle nests. Up to 15 males and 15 females are live-trapped and blood samples collected. Eggs are collected from each of 5-10 clutches per site using standard protocols; five eggs per clutch will be used for contaminant analysis and the rest for artificial incubation. Eggs will be incubated and hatchlings grown to 3 months of age in a growth chamber at CCIW controlling for temperature and moisture levels. Hatchlings are assessed for deformities (cranial-facial, tail, legs, carapace), survivorship, and growth rates. A subsample of young turtles are used for biomarker work ($n = 5-8$ per clutch).

**SAMPLING PARAMETERS (LIST)**

- Sex-dimorphism (morphology)
- Biomarkers – vitellogenin, plasma thyroid hormones (when possible), thyroid glands - hormone content and histology, EROD, vitamin A (hepatic, plasma), clinical chemistry
- Clutch size, hatching success
- Sex at hatch
- Hatchling size
- Growth over initial 3 months post-hatching
- OC / PCBs
- non-ortho PCBs
- Dioxins / Furans
- mercury at selected sites

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation FW-6, RM-2
- Delisting Objective
- Regulatory Requirement
- Other - Identify/Describe Monitoring of SNTU has occurred in Hamilton Harbour since 1984.

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

May - July: Adults and nesting sites located, blood sampling, clutches collected, eggs transported to incubation facilities by mid-June; adult sampling until end of July if necessary; July-September: assess hatching success, deformities; September-December: growth study, necropsies

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

unknown

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached  
West end of Cootes Paradise, 43 17’ 79 53’ and Grindstone Creek, 45 36’ 78 41’

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**


**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- YES ☑ NO

**DATA FORMAT (SPREADSHEET, DATABASE, etc)**

- TREND ANALYSIS PREPARED

- YES ☑ NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

Currently data collected in 2002 are being analysed so results are unavailable at this time. See papers for previous results.

**PUBLICATIONS PREPARED**

- YES ☑ NO

**COPY TO RAP OFFICE**

- YES ☑ NO
**PUBLICATIONS**


**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

Future monitoring will continue but is currently undefined given present involvement with multi-year snapping turtle project.

### DATA CONTACT PERSON

<table>
<thead>
<tr>
<th>NAME</th>
<th>POSITION</th>
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<tbody>
<tr>
<td>Dr. Kim Fernie</td>
<td>Wildlife Toxicologist</td>
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<tbody>
<tr>
<td><a href="mailto:kim.fernie@ec.gc.ca">kim.fernie@ec.gc.ca</a></td>
<td>905-336-4843</td>
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<tr>
<td>867 Lakeshore Road, PO Box 5050</td>
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<td>2005-08</td>
<td>June 2004 – 1st Edition</td>
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### OFFICIAL TITLE OF MONITORING PROGRAM

**Hamilton Harbour Fish Community AOC Monitoring – Fish Survey**

### NAME OF ORGANIZATION

Fisheries and Oceans Canada

### DESCRIPTION (WHAT IS BEING MONITORED)

Fish community structure and physical habitat attributes are monitored to determine the status of the impaired fish community and habitat restoration initiatives in Hamilton Harbour. The impairment and restoration of fish-related intrinsic uses of the Harbour are measured quantitatively using an Index of Biotic Integrity (IBI). Data is analyzed using an IBI developed specifically for Great Lakes littoral habitats.

### SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)

The electrofishing surveys were conducted at 1.5 metre water depth along transects that were 100 metres in length. Surveys were conducted 3 to 4 times per year (spring, summer and fall). Transect sites were marked with buoys and/or shore markers, and were approximately the same locations as in previous years. The surveys were initiated in the evening and continued after dark. Fish captured were identified to species by the field crew, individually measured and then returned to the water. Physical habitat and water quality information were also recorded at each transect location. For more details see Valere (1996).

### SAMPLING PARAMETERS (LIST)

**Fish:** Length (mm) and weight (g) of individual fish, total fish numbers, biomass, and species richness for each transect.

**Physical Habitat and Water Quality:** Water temperature and conductivity, secchi, dissolved oxygen, substrate size, macrophyte density, and weather.

**Other:** Time of survey, electroshocker settings, and transect locations (GPS coordinates).

### RATIONALE (LIST NUMBER(S) IF APPLICABLE)

- RAP Recommendation FW-11, RM-1
- Delisting Objective iii, xvi
- Regulatory Requirement
- Other - Identify/Describe

### FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)

Every 3 years

### NEXT MONITORING PERIOD (IDENTIFY YEAR)

2006 (Contingent on funding)

### LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE

Map Attached

### LIST YEAR(S) FOR WHICH DATA WAS COLLECTED


### DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON

- YES
- NO

### DATA FORMAT (SPREADSHEET, DATABASE, etc)

TREND ANALYSIS PREPARED

- YES
- NO

### BRIEFLY DESCRIBE RESULTS AND DISCUSSION

In summary, preliminary analysis of the 2002 fish assemblage data indicated both positive and negative results. The IBI analysis showed that areas in the western end of the Harbour around Bayfront Park had healthy warm-water fish assemblages that are within the IBI target range for Hamilton Harbour. In these areas, there were abundant, self-sustaining populations of largemouth bass. Significant decreases in common carp biomass in the Harbour were noted in 2002 resulting in an increase in the percentage of native fish biomass. Poor IBI scores for areas in the eastern end of the Harbour were a result of low catches dominated by non-native and generalist fishes in these areas. Low catches at transects along the Northeast shoreline resulted in low scores for the restored areas in comparison to the non-altered areas. A decline in numbers and biomass of several species belonging to the specialist group (e.g., pumpkinseed, logperch) may be related to environmental conditions (i.e., water quality and temperature), exotic species (e.g., round goby, double-crested cormorant) or natural fluctuations in fish populations. It is recommended that monitoring be undertaken at 3 year intervals to track future changes.


The future of this monitoring program is contingent on funding.

**DATA CONTACT PERSON**

<table>
<thead>
<tr>
<th>NAME</th>
<th>POSITION</th>
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<tbody>
<tr>
<td>Christine Brousseau / Robert Randall</td>
<td>Freshwater Research Biologist</td>
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<td>Fisheries and Oceans Canada (DFO)</td>
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<td>905-336-6287 / 4496</td>
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**METADATA LAST UPDATED (YYYY-MM)**

- 2005-08

**FIRST INCLUDED IN CATALOGUE**

- June 2004 – 1st Edition
Hamilton Harbour Fish Community AOC Monitoring – Fish Survey Locations
### Hamilton Harbour Fish Community AOC Monitoring – Macrophyte Survey

**OFFICIAL TITLE OF MONITORING PROGRAM**
Hamilton Harbour RAP Monitoring Catalogue: 2005

**NAME OF ORGANIZATION**
Fisheries and Oceans Canada

**DESCRIPTION (WHAT IS BEING MONITORED)**

Macrophyte cover is monitored to determine the relationship between measures of fish assemblages and fish habitats in AOCs. Habitat cover provides protection from environmental conditions (shade), protection from predators (refugia) and sources of food (invertebrates). The type and density of macrophytes determine the amount of cover that is available to fish. A number of factors such as photoperiod, water clarity and temperature, nutrients, depth and substrate size determine the type and abundance of macrophytes that will grow in a particular area. Pure sand or gravel areas are not optimal for most macrophytes, as their roots cannot properly penetrate the substrate. Mixed substrates with a quantity of organic matter are optimal for plant growth. Certain species of adult fish are often associated with submergent and emergent macrophyte cover, such as bowfin, northern pike, golden shiner, brown bullhead, American eel, pumpkinseed sunfish, and largemouth bass. Other adult fish prefer logs or boulders as cover with little or no macrophytes (e.g., smallmouth bass, walleye, and slimy sculpin). Similarly, fry and juvenile fish of many species (cyprinids, centrarchids, and percids) find refuge and food among macrophytes in shallow marshes and coastal wetlands of the Great Lakes. Many species spawn amongst submergent and emergent vegetation (bowfin, northern pike, pumpkinseed sunfish, and yellow perch) while others prefer submerged woody debris and large rocks (smallmouth bass, lake trout).

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, ETC.)**

Several macrophyte surveys have been conducted between 1990 and 2002 using 3 different methods: diving surveys (1990, 1991), visual estimation (e.g., 1990, 1991, 1993, 1995, and 2002), and echogram recordings (e.g., 1993, 1996, 1998). Macrophyte surveys were conducted at a subset of electrofishing transects in some years (1990, 1999) and at all surveyed electrofishing transects in other years (e.g., 1998 and 2002). Surveys were conducted at 1.5 metre water depth along 100-m transects. Surveys were conducted 3 to 4 times per year (spring, summer and fall) or later in the summer (August-September) in other years (e.g., 1990, 1991).

Diving surveys were conducted at a subset of electrofishing transects. Floating lines, 100-m in length, were laid out along the transects and divers searched for macrophytes at 10-m intervals along the line. For more details see Minns et al. (1993). Macrophyte abundance at transects was also estimated using two other methods: visual estimation and echo sounding. Visually, macrophyte abundance is assigned to one of four categories: none (0 %), sparse (1 to 19 %), moderate (20 to 70 %) or dense (>70 %). Dominant macrophytes are identified to genus and recorded on the field sheet. If a plant cannot be identified in the field, a sample is taken in a plastic bag and kept moist for identification at a later time. Echo sounding is conducted with a Lowrance X16 paper graph recorder. Settings are specific for different bottom types and predetermined to optimize the length, resolution, depth range and readability of the echogram. An echogram is taken along the 100 metre transect at the 1.5 m depth parallel to shore (Figure 2). For more details see Valere (1996).

**SAMPLING PARAMETERS (LIST)**

**Physical Habitat and Water Quality:** secchi depth, water temperature, macrophyte density and identification to genus or species, dominant macrophytes, plant height, and weather.

**Other:** Time of survey, and transect locations (GPS coordinates).

### Rationale (List Numbers If Applicable)

- [ ] RAP Recommendation RM-1
- [ ] Delisting Objective xvi
- [ ] Regulatory Requirement
- [ ] Other - Identify/Describe

### Frequency of Monitoring (Identify Season/Time of Year/Time of Day/No. of Times)

Every 3-4 years

### Next Monitoring Period (Identify Year)

2006 (Contingent on funding)

### Locations/Sites of Sites - Please Use Geographic X/Y Locations If Available

- [ ] Map Attached

### List Years for Which Data Was Collected

Results from the diving macrophyte surveys in 1990 and 1991 found that average stem densities and percent cover were lower in Hamilton Harbour and Bay of Quinte than in Severn Sound (Minns et al. 1993). The most common macrophyte was *Vallisneria* sp., comprising 77.3% of the macrophytes in the Harbour in 1991. The second most dominant macrophyte was *Myriophyllum spicatum*. Overall, *Vallisneria* and *Myriophyllum* predominated in Hamilton Harbour and there were few changes between years.

Macrophyte data was collected in most years that electrofishing was conducted in Hamilton Harbour (1988-2002). Macrophyte densities varied among years and showed an increase in the western end of the Harbour around Bayfront Park in recent years (e.g., 1998 and 2002). In 2002, total species richness increased from areas closest to the lake, west to Bayfront Park as wind exposure decreased and macrophyte density increases (Brousseau and Randall 2003). *Vallisneria* sp. and *Myriophyllum spicatum* are still the two most dominant macrophytes in the Harbour.

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**PUBLICATIONS**


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The future of this monitoring program in contingent on funding.
Hamilton Harbour Fish Community AOC Monitoring – Macrophyte Survey Locations
**OFFICIAL TITLE OF MONITORING PROGRAM**

Hamiton Harbour Contaminant Trend Monitoring Study

**NAME OF ORGANIZATION**

Fisheries & Oceans Canada, Great Lakes Laboratory for Fisheries & Aquatic Sciences

*RAP Office Note: In 2006, program will be in transition to Environment Canada*

**DESCRIPTION (WHAT IS BEING MONITORED)**

This project will measure trends in contaminant levels of selected indicator fish species resident in Hamilton Harbour and the supporting prey fish and invertebrate forage base. The objective of the study will be to provide an assessment of the trends in concentrations of contaminants of concern, which are bioavailable to the aquatic community of the AOC. This is an activity to demonstrate the impacts of remediation activities on contaminant burdens in the fish community. There will be a link developed between the contaminant burdens in measured adult fish and consumption restriction guidelines issued for key sports fish species resident in the harbour.

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

1. Collections of fish, benthic invertebrates and plankton will be collected throughout the harbour in a time span from late spring to mid summer.

2. An assessment of diet composition will be initiated to determine the relative importance of various prey species and invertebrates as contaminant transfer vectors.

3. Subsamples of edible portions will be taken from a range of adult fish processed and analyzed for the range of contaminants that are currently triggering consumption restrictions in the OME Guide to Eating Ontario Sport Fish - Hamilton Harbour.

4. Data summaries and assessments would commence in February with final draft reports to be submitted to the GLSF by April. This will include a comparison of the DFO generated whole fish data set with data available from the analyses of corresponding fillet (edible portion) samples from adult fish. The fillet data would be comparable to that produced by the Ontario Ministry of the Environment's Sport Fish Testing Program. This comparison will produce information on the relationship of contaminant levels found in different sample types and will be used to expand the utility of existing fish contaminant databases.

**SAMPLING PARAMETERS (LIST)**

1. Routine organochlorine pesticide (DDT metabolites, mirex, chlordane, dieldrin etc. and total PCB) assessment. 16 parameters. Whole fish and fillet analyses on individual large adult fish.

2. Total mercury (also whole fish: fillet analyses)

3. Other metals of concern (Pb, Cd, Cu, Ni, As, Se, Zn).

4. Ultra trace contaminants (dioxin/furan isomers & PCB isomers (used as a potential indicator of source).

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation FW-6
- Delisting Objective i
- Regulatory Requirement
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Annually, Biennially

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

Unknown – Program is in transition to Environment Canada

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached Cootes Paradise Fishway and sites throughout the Harbour

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**

2001/02, 2002/03, 2003/04

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

YES NO

**DATA FORMAT (SPREADSHEET, DATABASE, etc)**


TREND ANALYSIS PREPARED

☐ YES ☐ NO

BRIEFLY DESCRIBE RESULTS AND DISCUSSION

- PCB levels measured in samples of carp from Hamilton Harbour in 1994 were 35% less than levels measured in a similar aged sample of channel catfish from the 2001 Harbour sample.
- PCB levels in channel catfish were ~ 50% greater than levels detected in Lake Ontario lake trout of a similar age (whole fish) while ΣDDT levels were 30% less based on a similar comparison.
- Data from the OME sport fish contaminant survey indicated that PCB levels in Hamilton Harbour carp edible portions increased from 0.457 ug/g in 1987, (N= 14) to 0.635 ug/g, (N= 20) in 1994 - No ages provided.
- 60% of the channel catfish PCB levels in edible portions were greater than the 2.0 ug/g consumption limit (Range 2.9-5.8 ug/g).
- There was significant food web biomagnification of key indicator contaminants (PCB & DDT).
- Mercury levels in freshwater drum samples were ~ 30% greater than those detected in channel catfish samples despite the fact that the drum were on average 35% younger than the catfish (5.4 Vs 8.3 yrs).
- Whole fish to fillet ratios of contaminant levels ranged from 1.8 to 4.8 with lower ratios present in the most contaminated samples (i.e. whole fish contaminant concentration/skinless dorsal muscle concentration).

PUBLICATIONS PREPARED

☐ YES ☐ NO

PUBLICATIONS

FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES

DELIVERABLES:  2003/04:

- Complete food web sampling program to focus on selected indicator species (channel catfish, freshwater drum + forage fish species- goby, alewife, emerald shiner & juvenile white perch and gizzard shad + invertebrates (Gammarus, zebra mussels and plankton).
- Add carp and tubifex to indicator species list.
- Initiate biological assessment of samples including diet composition analyses.
- Initiate sample analyses incorporating additional chemicals of concern (i.e. PAHs).

DATA CONTACT PERSON

NAME

D.M. Whittle

POSITION

Emeritus Scientist (as of Jan 2006)

DEPARTMENT/DIVISION

GLLFA

AGENCY

Fisheries and Oceans Canada (DFO)

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CITY

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POSTAL CODE

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METADATA LAST UPDATED (YYYY-MM)

2006-01

FIRST INCLUDED IN CATALOGUE

June 2004 – 1st Edition
### Hamilton Harbour RAP Monitoring Catalogue: 2005

**January 2006**

### Official Title of Monitoring Program

**The Occurrence of Epidermal and Liver Tumours in White Suckers and Brown Bullheads**

**Name of Organization**  
Fisheries and Oceans Canada (DFO)

**RAP Office Note:** Program to be continued by Environment Canada in the future

**Description (What is being monitored)**  
Fish tumours

**Sampling Protocol (e.g., number of samples, depth of sample, etc.)**  
Sample brown bullheads and white suckers from Hamilton Harbour and eight other locations on Lake Ontario looking at tumour frequency, lip and body papillomas

**Sampling Parameters (List)**  
- Sample brown bullheads and white suckers from Hamilton Harbour and eight other locations on Lake Ontario looking at tumour frequency, lip and body papillomas

**Rationale (List Numbers if Applicable)**  
- RAP Recommendation FW-6
- Delisting Objective iv
- Regulatory Requirement
- Other - Identify/Describe

**Frequency of Monitoring (Identify Season/Time of Year/Time of Day/No. of Times)**  
Approximately every 7 – 10 years

**Next Monitoring Period (Identify Year)**  
Upon request from the RAP Office

**Locations(s) of Sites - Please use Geographic X/Y Locations if Available**  
Map Attached

**List Year(s) for Which Data Was Collected**  
1979-80, 1985-87, 1992-96

**Data Available to the Public Through Contact Person**  
- Yes
- No

**Trend Analysis Prepared**  
- Yes
- No

**Briefly Describe Results and Discussion**  
*RAP Office Note: V. Cairns has suggested that further studies could omit white suckers and focus efforts on brown bullheads.*

**Publications Prepared**  
- Yes
- No

**Future Monitoring – Identify Any Known Programs That Are in the Development Stage or Should Be Considered to Answer Emerging Issues**  
Upon request from the RAP Office

### Data Contact Person

**Name**  
Victor Cairns

**Position**  
Emeritus (as of 2005)

**Agency**  
Fisheries and Oceans Canada (DFO)

**Email**  
cairnsv@dfo-mpo.gc.ca

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**City**  
Burlington

**Province**  
Ontario

**Postal Code**  
L7R 4A6

**Metadata Last Updated (YYYY-MM)**  
2004

**First Included in Catalogue**  
June 2004 – 1st Edition
**OFFICIAL TITLE OF MONITORING PROGRAM**

**Great Lakes Index-Reference Station Monitoring**

**NAME OF ORGANIZATION**

Ontario Ministry of the Environment (OMOE)

**DESCRIPTION (WHAT IS BEING MONITORED)**

Water, sediment, and suspended sediment quality, benthic invertebrate enumeration and taxonomy

Survey 1 (spring) - conduct physical measurements and water quality sampling and deploy sediment traps
Survey 2 (late summer) - conduct physical measurements, water quality, sediment quality and benthic invertebrate sampling
Survey 3 (fall) - conduct physical measurements and water quality sampling at sites and collect material from sediment traps and remove sediment traps

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

Project Description was provided to the RAP Office – contact for full details for each of the below study parts:

- Water (spring, summer and fall surveys)
- Surficial Sediments For Chemical Analysis (summer)
- Suspended Sediments (sediment traps, spring-fall survey)
- Benthic Invertebrate (spring and summer survey):
- Phytoplankton (single samples collected on each of the spring, summer and fall surveys from all sites)
- Zooplankton (single composite samples collected on each of the spring, summer and fall surveys from all sites)

**SAMPLING PARAMETERS (LIST)**

Major ions, nutrient status, metals, PCB/OCs, PAHs, physical parameters (Project Description was provided to the RAP Office – contact for full details)

**Surface Water Samples:** Turbidity, Chloride, Cations (Ca, Mg, Na, K), Chlorophyll, DOC and Silicate, Nitrates and Ammonium, Mercury, Suspended Solids, Total P and Kjeldahl-nitrogen, Alkalinity, Conductivity, Lab pH, Sulphate, Metals scan by ICP

**Sediment Samples:** chlorobenzenes, OC pesticides, PAHs, PCB-total, Chlorinated dioxins and furans, Dioxin-like PCB congeners, mercury, arsenic, metals scan, Particle size, TOC, Total P & N

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation
- Regulatory Requirement
- Delisting Objective viii
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

3 times/year (spring, late summer, and fall) every third year

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

2006

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached

Index Station 258  Position: Lat. 43 17 19.7  Long. 79 50 10.5

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**

2003

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

YES NO

**DATA FORMAT (SPREADSHEET, DATABASE, etc)**

**TREND ANALYSIS PREPARED**

YES NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

The primary use intended for the information collected in this project will be as input to Great Lakes management programs for the purposes of assessing progress in meeting program objectives and to assess the success of programs designed to restore or protect environmental quality in the Great Lakes.
<table>
<thead>
<tr>
<th><strong>PUBLICATIONS PREPARED</strong></th>
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**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

**DATA CONTACT PERSON**

<table>
<thead>
<tr>
<th><strong>NAME</strong></th>
<th>Todd Howell</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POSITION</strong></td>
<td>Great Lakes Ecologist</td>
</tr>
<tr>
<td><strong>DEPARTMENT/DIVISION</strong></td>
<td>Water Monitoring Section, Env. Mon. and Reporting Branch</td>
</tr>
<tr>
<td><strong>AGENCY</strong></td>
<td>Ontario Ministry of the Environment</td>
</tr>
<tr>
<td><strong>EMAIL</strong></td>
<td><a href="mailto:Todd.Howell@ene.gov.on.ca">Todd.Howell@ene.gov.on.ca</a></td>
</tr>
<tr>
<td><strong>TELEPHONE</strong></td>
<td>416-235-6225</td>
</tr>
<tr>
<td><strong>FAX</strong></td>
<td>416-235-6235</td>
</tr>
<tr>
<td><strong>ADDRESS</strong></td>
<td>125 Resources Road, West Wing</td>
</tr>
<tr>
<td><strong>CITY</strong></td>
<td>Etobicoke</td>
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**META DATA LAST UPDATED (YYYY-MM)**: 2004-05

**FIRST INCLUDED IN CATALOGUE**: June 2004 – 1st Edition
### OFFICIAL TITLE OF MONITORING PROGRAM

**Great Lakes Nearshore Monitoring and Assessment – Sediment Screening**

### NAME OF ORGANIZATION

Ontario Ministry of the Environment (OMOE)

### DESCRIPTION (WHAT IS BEING MONITORED)

Surficial Sediment Chemistry

### SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)

1 triplicate sample of surficial sediment (top 3 cm) obtained at 4 stations in late summer

### SAMPLING PARAMETERS (LIST)

- Sediment quality – nutrient status, metals, PCBs/OCs, PAHs, physical parameters
- Benthic invertebrate community – taxonomy and enumeration

### RATIONALE (LIST NUMBER(S) IF APPLICABLE)

- RAP Recommendation
- Regulatory Requirement
- Delisting Objective

### FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)

1 time/year (late summer) every third year from 1994 to 2000

### NEXT MONITORING PERIOD (IDENTIFY YEAR)

Unknown

### LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE

- Map Attached

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### LIST YEAR(S) FOR WHICH DATA WAS COLLECTED

- 2000

### DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON

- Yes

### DATA FORMAT (SPREADSHEET, DATABASE, etc)

- Spreadsheet

### TREND ANALYSIS PREPARED

- Yes

### PUBLICATIONS PREPARED

- Yes

### PUBLICATIONS

Report will be provided to RAP office when available (summer 2004)

### DATA CONTACT PERSON

**NAME**

Lisa Richman

**POSITION**

Great Lakes Scientist

**DEPARTMENT/DIVISION**

Water Monitoring Section, Env. Mon. and Reporting Branch

**AGENCY**

Ontario Ministry of the Environment

**EMAIL**

Lisa.Richman@ene.gov.on.ca

**TELEPHONE**

416-235-6257

**FAX**

416-235-6235

**ADDRESS**

125 Resources Road, West Wing

**CITY**

Etobicoke

**PROVINCE**

Ontario

**POSTAL CODE**

M9P 3V6

**FIRST INCLUDED IN CATALOGUE**

June 2004 – 1st Edition
## Sport Fish Contaminant Monitoring Program

**OFFICIAL TITLE OF MONITORING PROGRAM**
Sport Fish Contaminant Monitoring Program

**NAME OF ORGANIZATION**
Ontario Ministry of the Environment (OMOE)

**DESCRIPTION (WHAT IS BEING MONITORED)**
The Guide to Eating Ontario Sport Fish gives consumption advice for sport fish from Ontario waters. The Guide is published every other year by the Ministry of the Environment in co-operation with the Ministry of Natural Resources. The Sport Fish Contaminant Monitoring Program is the largest testing and advisory program of its kind in North America. Fish have been tested from approximately 1,700 locations in Ontario’s inland lakes and rivers and Great Lakes. Between 4,000 and 6,000 fish per year are tested through the program, which has been testing Ontario sport fish for more than 25 years.

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**
Staff at the Ministry of Natural Resources and Ministry of the Environment collect fish and send them to the Ministry of the Environment laboratory in Toronto.

**SAMPLING PARAMETERS (LIST)**
The fish are analyzed for a variety of substances, including mercury, PCBs, mirex, DDT and dioxins. The results are used to develop the tables in the Guide, which give size-specific consumption advice for each species tested from each location. This advice is based on health protection guidelines developed by Health Canada.

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**
- RAP Recommendation RM-2
- Delisting Objective i
- Regulatory Requirement
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**
2007-2008

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**
Map Attached

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**
1978 - present

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

**DATA FORMAT (SPREADSHEET, DATABASE, etc)**

**TREND ANALYSIS PREPARED**

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

**PUBLICATIONS PREPARED**

**DATA CONTACT PERSON**

**NAME**

**POSITION**

**AGENCY**
Ontario Ministry of the Environment

**EMAIL**
sportfish@ene.gov.on.ca

**TELEPHONE**
416-327-6816

**FAX**
416-327-6519

**METADATA LAST UPDATED (YYYY-MM)**
2006-01

**FIRST INCLUDED IN CATALOGUE**
June 2004 – 1st Edition
# Wastewater Treatment Plant (WWTP) Effluent Monitoring

## Official Title of Monitoring Program

**Wastewater Treatment Plant (WWTP) Effluent Monitoring**

## Name of Organization

City of Hamilton

## Description (What is being monitored)

Final effluent discharge from Woodward, Dundas (King), and Waterdown (Main) WWTPs

## Sampling Protocol (E.g. Number of Samples, Depth of Sample, etc.)

### Woodward Avenue WWTP
Two time sequenced automatic water quality samplers are positioned over the twin box channel conveying final effluent at the plant. A 24 hour refrigerated composite sample is collected 5 days per week and analysed by the on site City Lab.

### Dundas (King St.) and Waterdown (Main St.) WWTP's
A flow proportional automatic water quality sampler collects a refrigerated 24 hour composite sample one day per week. Samples are analyzed by the City Lab at the Woodward Avenue Facility.

## Sampling Parameters (List)

**Woodward Avenue WWTP**
- Alkalinity, cBOD, Ammonia, Nitrites, Nitrates, pH, SP, TSS, TKN, TP, Flow monitored daily.
- Conductivity and Chloride are monitored weekly.
- E.Coli and Chlorine Residual are monitored weekly between the dates of May 15, and October 15.

**Dundas (King St.) and Waterdown (Main St.) WWTP's**
- Ph, Alkalinity, cBOD, Ammonia, Nitrite, Nitrate, TSS, SP, TP, TKN, E.Coli, Chlorine Residual monitored weekly

## Rationale (List Number(s) If Applicable)

- RAP Recommendation WQ – 1b, WQ – 1d
- Regulatory Requirement Ontario Ministry of the Environment
- Other - Identify/Describe

## Frequency of Monitoring (Identify Season/Time of Year/Time of Day/No. of Times)

Woodward – 5 days/week, Dundas WWTP – 1day/week, Waterdown WWTP – 1day/week

## Next Monitoring Period (Identify Year)

2006

## Location(s) of Sites - Please Use Geographic X/Y Locations If Available

Map Attached

## List Year(s) For Which Data Was Collected

Electronic database back to 1997

## Data Available to the Public Through Contact Person

- YES
- NO

## Data Format (Spreadsheet, Database, etc)

- Yes
- No

## Trend Analysis Prepared

- YES
- NO

## Briefly Describe Results and Discussion

## Publications Prepared

- YES
- NO

## Copy to RAP Office

- YES
- NO

## Publications

- City of Hamilton Annual Wastewater Reports

## Future Monitoring – Identify Any Known Programs That Are in the Development Stage or Should Be Considered to Answer Emerging Issues

---

28
DATA CONTACT PERSON

<table>
<thead>
<tr>
<th>NAME</th>
<th>POSITION</th>
<th>AGENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark Bainbridge</td>
<td>Project Manager, Water Quality</td>
<td>City of Hamilton</td>
</tr>
<tr>
<td></td>
<td>DEPARTMENT/DIVISION</td>
<td></td>
</tr>
<tr>
<td>Public Works Dept, Water and Wastewater Treatment Section</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMAIL</td>
<td>TELEPHONE</td>
<td>FAX</td>
</tr>
<tr>
<td><a href="mailto:mbainbri@hamilton.ca">mbainbri@hamilton.ca</a></td>
<td>905-546-2424 x 5959</td>
<td>905-546-4491</td>
</tr>
<tr>
<td>ADDRESS</td>
<td>CITY</td>
<td>PROVINCE</td>
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<tr>
<td>55 John Street North, 6th Floor</td>
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<td>Ontario</td>
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<td>June 2004 – 1st Edition</td>
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Shaded area is within the boundaries of the City of Hamilton
### Combined Sewer Overflow Monitoring

**Official Title of Monitoring Program**
Combined Sewer Overflow Monitoring

**Name of Organization**
City of Hamilton

**Description (What is being monitored)**
Combined Sewage Overflow Storage Tank

**Sampling Protocol (e.g., number of samples, depth of sample, etc.)**
One influent and one overflow sample (if generated) of each storm directed into the tank

**Sampling Parameters (List)**
cBOD, Ammonia, Phosphorous, TKN, TSS, E.coli, Copper, Lead, Zinc, Iron

**Rationale (List Number(s) if applicable)**
- RAP Recommendation WQ – 1b, WQ – 1c, WQ – 1d
- Delisting Objective viii
- Regulatory Requirement
- Other - Identify/Describe

**Frequency of Monitoring (Identify Season/Time of Year/Time of Day/No. of Times)**
Constant monitoring. 24 hr composite of each storm

**Next Monitoring Period (Identify Year)**
2006

**Location(s) of Sites - Please Use Geographic X/Y Locations if Available**
Map Attached Main King CSO Tank, Eastwood CSO Tank, Bayfront CSO Tank, James St. CSO Tank

**List Year(s) for Which Data was Collected**
2002-2005

**Data Available to the Public Through Contact Person**
- Yes [x] No [ ] IF NO PLEASE EXPLAIN:

**Trend Analysis Prepared**
- Yes [ ] No [x]

**Briefly Describe Results and Discussion**
CSO Tank – Annual Performance Report – 2003 available from the RAP Office upon request (too long to incorporate here).

**Publications Prepared**
- Yes [ ] No [x]

**Publications**
- Yes [ ] No [x]

**Future Monitoring – Identify Any Known Programs that are in the Development Stage or Should be Considered to Answer Emerging Issues**
Also getting set up to sample Greenhill in addition to the current overflow monitoring at this tank.

### Data Contact Person

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greg Gowing</td>
<td>Water Quality Technologist</td>
<td>City of Hamilton</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Email</th>
<th>Telephone</th>
<th>Fax</th>
</tr>
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<tbody>
<tr>
<td><a href="mailto:ggowing@hamilton.ca">ggowing@hamilton.ca</a></td>
<td>905-546-2424 x 2823</td>
<td>905-546-4491</td>
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<td>55 John Street North, 6th Floor</td>
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<td>Ontario</td>
<td>L8R 3M8</td>
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<th>First Included in Catalogue</th>
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<tr>
<td>2006-01</td>
<td>June 2004 – 1st Edition</td>
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</table>
**Hamilton Harbour Beach Monitoring Program**

**OFFICIAL TITLE OF MONITORING PROGRAM**

Hamilton Harbour Beach Monitoring Program

**NAME OF ORGANIZATION**

City of Hamilton: Health Protection Branch

**DESCRIPTION (WHAT IS BEING MONITORED)**

Recreational Beach Water Quality

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

Minimum five grab samples per site (evenly spaced apart)

**SAMPLING PARAMETERS (LIST)**

- Escherchia coli levels

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation: WQ-1a, WQ-1c, RM-3
- Regulatory Requirement
- Delisting Objective: X
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Once a week

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

2006

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

- Map Attached
- Bayfront Beach and Pier 4 Beach

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**

1995 - 2005

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- YES ☑ NO ☐

**DATA FORMAT (SPREADSHEET, DATABASE, etc)**

- Website, Safe Water Hotline, Database

**TREND ANALYSIS PREPARED**

- YES ☑ NO ☐

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

As far as is known at this point, the reasons for elevated E.coli counts in the Hamilton Harbour beaches area, is a result of waterfowl activity, runoff, and perhaps a lack of flow in that part of the harbour.

**PUBLICATIONS PREPARED**

- YES ☑ NO ☐

**PUBLICATIONS**

- [www.myhamilton.ca/myhamilton/CityandGovernment/HealthandSocialServices/PublicHealth/SafeWater/BeachQuality](http://www.myhamilton.ca/myhamilton/CityandGovernment/HealthandSocialServices/PublicHealth/SafeWater/BeachQuality)

**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

Monitoring effectiveness of a bird exclusion project at Pier 4 Beach during 2006 and 2007 swimming seasons. The goal is to determine if excluding waterfowl from the Pier 4 beach and bathing water will improve the microbiological quality (reduce E.coli levels) of the Pier 4 bathing water. City of Hamilton Public Health and Public Works Depts, BARC (John Hall), and CCIW (Murray Charlton) are collaborating in this project.

**DATA CONTACT PERSON**

**NAME**

Eric Mathews

**POSITION**

Manager, Safe Water Program

**DEPARTMENT/DIVISION**

Public Health & Community Services

**AGENCY**

City of Hamilton

**EMAIL**

ematthews@hamilton.ca

**TELEPHONE**

905-546-2424 x 2186

**FAX**

905-546-2787

**ADDRESS**

1 Hughson St N – 3rd Floor

**CITY**

Hamilton

**PROVINCE**

Ontario

**POSTAL CODE**

L8R 3L5

**META DATA LAST UPDATED (YYYY-MM)**

2005-08

**FIRST INCLUDED IN CATALOGUE**

June 2004 – 1st Edition
<table>
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<tr>
<th>OFFICIAL TITLE OF MONITORING PROGRAM</th>
<th>Skyway Wastewater Treatment Plant (WWTP) Effluent Monitoring</th>
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<tbody>
<tr>
<td>NAME OF ORGANIZATION</td>
<td>Regional Municipality of Halton</td>
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<tr>
<td>DESCRIPTION (WHAT IS BEING MONITORED)</td>
<td>Final effluent discharge from Skyway WWTP</td>
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<tr>
<td>SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)</td>
<td>Weekly 24 hour composite samples are taken – Depth (N/A)</td>
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<td>SAMPLING PARAMETERS (LIST)</td>
<td>Total phosphorous, Ammonia as nitrogen (NH3-N), TKN, Nitrite (NO2-N), Nitrate (NO3-N), Un-ionized ammonia (NH3+), pH, CDOD (Carbonaceous Biochemical Oxygen Demand), E.coli (currently measured continuously), Metals including hydrides - (monthly), Organics (annually)</td>
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<td>□ RAP Recommendation WQ – 1b, WQ – 1d □ Regulatory Requirement Ontario Ministry of the Environment</td>
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<td>NEXT MONITORING PERIOD (IDENTIFY YEAR)</td>
<td>2006</td>
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<td>LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE</td>
<td>□ Map Attached</td>
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<td>LIST YEAR(S) FOR WHICH DATA WAS COLLECTED</td>
<td>1994 – 2005 (Readily available) , pre 1994 is archived</td>
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<td>DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON</td>
<td>□ YES □ NO</td>
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<tr>
<td>TREND ANALYSIS PREPARED</td>
<td>□ YES □ NO</td>
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<tr>
<td>BRIEFLY DESCRIBE RESULTS AND DISCUSSION</td>
<td>Halton continues to meet and exceed RAP and MOE targets at the Skyway WWTP</td>
</tr>
<tr>
<td>PUBLICATIONS PREPARED</td>
<td>□ YES □ NO</td>
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<tr>
<td>PUBLICATIONS</td>
<td>• 2003 Performance Report – Burlington Skyway WWTP – available on the website listed above</td>
</tr>
<tr>
<td>FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES</td>
<td>Due to increased need to identify NPRI listed substances Halton has increased organic sampling for 2004.</td>
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DATA CONTACT PERSON

<table>
<thead>
<tr>
<th>NAME</th>
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<tbody>
<tr>
<td>To be determined after position vacated (Contact RAP Office – 905-336-6278)</td>
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DEPARTMENT/DIVISION
Planning & Public Works – Environmental Services

AGENCY
Regional Municipality of Halton

EMAIL

TELEPHONE

FAX

ADDRESS

CITY
Oakville

PROVINCE
Ontario

POSTAL CODE

METADATA LAST UPDATED (YYYY-MM)
2005-08

FIRST INCLUDED IN CATALOGUE
June 2004 – 1st Edition

Skyway Wastewater Treatment Plant (WWTP) Effluent Monitoring

Sample location is approximate
### Grindstone Creek Water Quality Monitoring

**OFFICIAL TITLE OF MONITORING PROGRAM**

Grindstone Creek Water Quality Monitoring

**NAME OF ORGANIZATION**

Conservation Halton

**DESCRIPTION (WHAT IS BEING MONITORED)**

water quality

**SAMPLING PROTOCOL (E.G., NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

Grab samples for general water chemistry, in keeping with MOE sampling protocols, are carried out monthly in Grindstone Creek at Unsworth Ave., Burlington from March until October as part of the Provincial Water Quality Monitoring Program. The timing of the sample runs tries to reflect a variety of weather and flow conditions in the watershed, including high, medium and base flows, the spring freshette and wet and dry events. Samples are placed on ice and transported to either the MOE Central Lab, Etobicoke or Woodward WWTP lab in Hamilton for analysis. Temperature, conductivity, dissolved oxygen concentration and pH are measured in the field.

**SAMPLING PARAMETERS (LIST)**

- solids (suspended, total, dissolved), pH, conductivity, total alkalinity, hardness, DO, temp, turbidity, ammonia, ammonium, nitite, nitrate, phosphate, total phosphorus, TKN, metals

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation WQ-1a, RM-4
- Delisting Objective viii
- Regulatory Requirement
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Monthly from March to October (maximum 8 samples/year)

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

2006

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**


**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- YES
- NO

**DATA FORMAT (SPREADSHEET, DATABASE, etc.)**

- YES
- NO

**TREND ANALYSIS PREPARED**

- YES
- NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

**PUBLICATIONS PREPARED**

- YES
- NO

**COPY TO RAP OFFICE**

- YES
- NO

**PUBLICATIONS**


**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

**DATA CONTACT PERSON**

- **NAME**: David Gale
- **POSITION**: Watershed Planner
- **DEPARTMENT/DIVISION**: Watershed Planning Services
- **AGENCY**: Conservation Halton
- **EMAIL**: dgale@hrca.on.ca
- **TELEPHONE**: 905-336-1158 x 244
- **FAX**: 905-336-7014
- **ADDRESS**: 2596 Britannia Road West, RR # 2, Milton, Ontario, L9T 2X6
- **FIRST INCLUDED IN CATALOGUE**: June 2004 – 1st Edition

**METADATA LAST UPDATED (YYYY-MM)**

2005-08
Grindstone Creek Water Quality Monitoring (Conservation Halton)

Sample location is approximate
<table>
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<tr>
<th>OFFICIAL TITLE OF MONITORING PROGRAM</th>
<th>Benthic Monitoring – Grindstone Creek Watershed</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME OF ORGANIZATION</td>
<td>Conservation Halton</td>
</tr>
<tr>
<td>DESCRIPTION (WHAT IS BEING MONITORED)</td>
<td>Benthic invertebrates</td>
</tr>
<tr>
<td>SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)</td>
<td>Ontario Benthos Biomonitoring Network (OBBN) Protocol- The OBBN sampling protocol is based on the reference condition approach whereby sites are compared to previously selected reference sites, sites typically defining normal biological conditions for a given habitat. These reference sites are selected based on their minimal influence from human activity including factors such as point-source contamination, loss of riparian habitat and aquatic habitat disruption.</td>
</tr>
<tr>
<td>SAMPLING PARAMETERS (LIST)</td>
<td>Benthic invertebrates, stream habitat</td>
</tr>
<tr>
<td>RATIONALE (LIST NUMBER(S) IF APPLICABLE)</td>
<td>☑ RAP Recommendation RM- 4  ☐ Regulatory Requirement  ☐ Delisting Objective  ☐ Other - Identify/Describe</td>
</tr>
<tr>
<td>FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)</td>
<td>Stations are sampled once per year. Stations sampled each year may vary with the exception of 2 annual stations.</td>
</tr>
<tr>
<td>NEXT MONITORING PERIOD (IDENTIFY YEAR)</td>
<td>2006</td>
</tr>
<tr>
<td>LOCATIONS(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE</td>
<td>Map Attached</td>
</tr>
<tr>
<td>LIST YEAR(S) FOR WHICH DATA WAS COLLECTED</td>
<td>Annual stations have begun sampling in 2005. Additional sampling has been completed in Hidden Valley Park and a private property as a part of long term monitoring of rehabilitation projects.</td>
</tr>
<tr>
<td>DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON</td>
<td>✓ YES  ☐ NO</td>
</tr>
<tr>
<td>TREND ANALYSIS PREPARED</td>
<td>☐ YES  ☑ NO</td>
</tr>
<tr>
<td>PUBLICATIONS PREPARED</td>
<td>☑ YES  ☐ NO</td>
</tr>
<tr>
<td>FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES</td>
<td>Conservation Halton has begun their new long term monitoring program. With this program all watersheds within the Conservation Halton jurisdiction will be studied thoroughly on a five year rotation. The Grindstone Creek watershed is scheduled to be studied in the coming years. In the meantime, 2 annual stations within Grindstone Creek will be studied for fish, benthic invertebrates and channel morphology.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATA CONTACT PERSON</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTACT NAME</td>
</tr>
<tr>
<td>POSITION</td>
</tr>
<tr>
<td>DEPARTMENT/DIVISION</td>
</tr>
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<td>AGENCY</td>
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<td>EMAIL</td>
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<td>ADDRESS</td>
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<td>CITY</td>
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<td>POSTAL CODE</td>
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<td>FIRST INCLUDED IN CATALOGUE</td>
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<td>METADATA LAST UPDATED (YYYY-MM)</td>
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</table>
Benthic Monitoring – Grindstone Creek Watershed (Conservation Halton)
**Official Title of Monitoring Program**

Provincial Water Quality Monitoring Network – Spencer, Ancaster, and Redhill Creek

**Name of Organization**

Hamilton Conservation Authority / MOE

**Description (What is Being Monitored)**

Identify long-term ambient water quality trends, determine the general location and causes of water quality problems, and to measure the effectiveness of broad pollution control and water management programs.

**Sampling Protocol (e.g. Number of Samples, Depth of Sample, etc.)**

Number of Stations: 6

Sampled at monthly intervals during the ice-free period (March/April to October/November), to a maximum of eight (8) samples per year per station. Sample is taken at approximately 30 cm depth, usually between 9 am and 3 pm.

**Sampling Parameters (List)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALKALINITY, TOTAL</td>
<td></td>
</tr>
<tr>
<td>ALUMINIUM, UNFILTERED TOTAL</td>
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</tr>
<tr>
<td>AMMONIUM, TOTAL UNFILTERED</td>
<td></td>
</tr>
<tr>
<td>BARIUM, UNFILTERED TOTAL</td>
<td></td>
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<tr>
<td>BERYLLIUM, UNFILTERED TOTAL</td>
<td></td>
</tr>
<tr>
<td>CADMIUM, UNFILTERED TOTAL</td>
<td></td>
</tr>
<tr>
<td>CALCIUM, UNFILTERED TOTAL</td>
<td></td>
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<tr>
<td>CHLORIDE, UNFILTERED REACTIVE</td>
<td></td>
</tr>
<tr>
<td>CHROMIUM, UNFILTERED TOTAL</td>
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</tr>
<tr>
<td>COBALT, UNFILTERED TOTAL</td>
<td></td>
</tr>
<tr>
<td>CONDUCTIVITY, 25C</td>
<td></td>
</tr>
<tr>
<td>CONDUCTIVITY, AMBIENT</td>
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</tr>
<tr>
<td>COPPER, UNFILTERED TOTAL</td>
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</tr>
<tr>
<td>HARDNESS, TOTAL</td>
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<td>IRON, UNFILTERED TOTAL</td>
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<tr>
<td>LEAD, UNFILTERED TOTAL</td>
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<td>MAGNESIUM, UNFILTERED TOTAL</td>
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<td>MANGANESE, UNFILTERED TOTAL</td>
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<tr>
<td>MOLYBDENUM, UNFILTERED TOTAL</td>
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<td>NICKEL, UNFILTERED TOTAL</td>
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<td>NITRATES TOTAL, UNFILTERED REACTIVE</td>
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<td>NITRITE, UNFILTERED REACTIVE</td>
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<tr>
<td>NITROGEN, TOT, C100, UNFILTERED, REACTIVE</td>
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<td>PH (-LOG H+ CONCN)</td>
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<tr>
<td>PH FIELD</td>
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<td>PHOSPHATE, FILTERED REACTIVE</td>
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<td>PHOSPHORUS, UNFILTERED TOTAL</td>
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<td>POTASSIUM, UNFILTERED TOTAL</td>
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<td>RESIDUE, FILTERED</td>
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<td>SODIUM, UNFILTERED TOTAL</td>
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<td>STREAM CONDITION</td>
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<td>STRONTIUM, UNFILTERED TOTAL</td>
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<td>TEMPERATURE, WATER</td>
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<td>TITANIUM, UNFILTERED TOTAL</td>
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<td>TURBIDITY</td>
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<tr>
<td>VANADIUM, UNFILTERED TOTAL</td>
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<tr>
<td>ZINC, UNFILTERED TOTAL</td>
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</table>

**Rationale (List Numbers If Applicable)**

- RAP Recommendation
  - WQ-1a, RM-4
- Delisting Objective
  - viii
- Regulatory Requirement
- Other - Identify/Describe: determined by the Province (MOE)

**Frequency of Monitoring (Identify Season/Time of Year/Time of Day/No. of Times)**

See above

**Next Monitoring Period (Identify Year)**

2006

**Location(s) of Sites - Please Use Geographical X/Y Locations If Available**

- Map Attached

<table>
<thead>
<tr>
<th>Station Name</th>
<th>X Coordinate</th>
<th>Y Coordinate (UTM Zone 17)</th>
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</thead>
<tbody>
<tr>
<td>Spencer Creek near Westover</td>
<td>574896.93085</td>
<td>4800333.26390</td>
</tr>
<tr>
<td>Spencer Creek near Hwy 5</td>
<td>577034.90329</td>
<td>4792595.05984</td>
</tr>
<tr>
<td>Spencer Creek near Dundas</td>
<td>584004.94014</td>
<td>4790820.15111</td>
</tr>
<tr>
<td>Redhill Creek near Albion Falls</td>
<td>595770.59596</td>
<td>4783808.49950</td>
</tr>
<tr>
<td>Redhill Creek near Queenston Road</td>
<td>598764.59429</td>
<td>4787271.54096</td>
</tr>
<tr>
<td>Ancaster Creek near Wilson Road</td>
<td>583324.4894</td>
<td>4787003.1326</td>
</tr>
</tbody>
</table>

**List Years(s) for Which Data Was Collected**

## DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON

- **YES**
- **NO**

**IF NO PLEASE EXPLAIN:**

### DATA FORMAT (SPREADSHEET, DATABASE, etc)

### TREND ANALYSIS PREPARED

- **YES**
- **NO**

### BRIEFLY DESCRIBE RESULTS AND DISCUSSION

Program began in Hamilton in 2002, hence longer term data are required in order to do valuable statistical analyses and trend identification.

### PUBLICATIONS PREPARED

- **YES**
- **NO**

### COPY TO RAP OFFICE

- **YES**
- **NO**

### PUBLICATIONS

### FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES

### DATA CONTACT PERSON

<table>
<thead>
<tr>
<th>NAME</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diana Lupsa</td>
<td>Water Resources Technologist</td>
</tr>
</tbody>
</table>

**DEPARTMENT/DIVISION**

- Watershed Planning and Engineering

**AGENCY**

- Hamilton Conservation Authority

**EMAIL**

- dlupsa@conservationhamilton.ca

**TELEPHONE**

- 905-525-2181 x 138

**FAX**

- 905-648-4622

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**CITY**

- Hamilton

**PROVINCE**

- Ontario

**POSTAL CODE**

- L9G 3L3

**METADATA LAST UPDATED (YYYY-MM)**

- 2005-08

**FIRST INCLUDED IN CATALOGUE**

- June 2004 – 1st Edition
BioMAP Monitoring – HCA Watershed

Hamilton Conservation Authority

BioMAP is a method of qualifying water quality as “impaired” or “unimpaired” based on the taxonomic composition of the benthic invertebrate community existing within the substrate and attached to surfaces within a given reach of watercourse.

BioMAP (d) is a quantitative index that measures water quality using an abundance-weighted approach, where rare, sensitive taxa are weighted more heavily than common, stress-tolerant taxa in calculating the index. BioMAP (q) is a qualitative measure of water quality based solely on the presence of taxa in all possible habitats available at a given station.

Benthic invertebrates, temperature, pH, conductivity, dissolved oxygen (DO)

Rationale (List Number(s) if applicable)
- RAP Recommendation RM - 4
- Regulatory Requirement
- Delisting Objective
- Other - Identify/Describe

Frequency of Monitoring (Identify Season/time of year/time of day/no. of times)
1 time/year

Next Monitoring Period (Identify Year)
2006

Location(s) of Sites - Please use geographic x/y locations if available
Map Attached

In 2005, HCA sampled 23 stations within its jurisdiction. Sampling efforts were focused on “Year 2” of HCA’s Aquatic Resource Monitoring Program, six annually monitored surface water quality stations, and two HCA project-related stations.

List Year(s) for which data was collected
1999 – 2005

Data Available to the Public through Contact Person
- Yes
- No

Data Format (Spreadsheet, Database, etc)

Trend Analysis Prepared
- Yes
- No

Briefly Describe Results and Discussion
Unable to perform a meaningful analysis of the existing data since only 4 years of data have been generated, and a few stations have yet been replicated.

Publications Prepared
- Yes
- No

Publications

Future Monitoring – Identify Any Known Programs That Are in the Development Stage or Should Be Considered to Answer Emerging Issues
In 2004, HCA developed an Aquatic Resource monitoring program, which will see the cyclical monitoring of 50 stations across HCA’s watersheds. Six stations that correspond with the HCA’s Provincial Water Quality Monitoring Network and flow gauge stations will be annually monitored to compare surface water quality trends with the benthic water quality results. The remaining stations are monitored on a 3 year basis.

Data Contact Person

Name
Shari Wiseman

Position
Ecologist

Department/Division
Watershed Planning and Engineering

Agency
Hamilton Conservation Authority
BioMAP Monitoring – HCA Watershed (Hamilton Conservation Authority)
**OFFICIAL TITLE OF MONITORING PROGRAM**

**Fish and Fish Habitat Monitoring – Spencer Creek Watershed**

**NAME OF ORGANIZATION**

Hamilton Conservation Authority

**DESCRIPTION (WHAT IS BEING MONITORED)**

Fish species, abundance, and biomass; fish habitat and channel form

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

**SAMPLING PARAMETERS (LIST)**

Fish species, abundance, and biomass; temperature, pH, conductivity, dissolved oxygen (DO), fish habitat, and channel form

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation RM - 4
- Regulatory Requirement
- Delisting Objective
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

1 time/year

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

2006

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached

In 2005, HCA sampled 23 stations within its jurisdiction. Sampling efforts were focused on “Year 2” of HCA’s Aquatic Resource Monitoring Program, six annually monitored surface water quality stations, and two HCA project-related stations.

**LIST YEARS(S) FOR WHICH DATA WAS COLLECTED**

1990 - present

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

YES ☒ NO

If No, please explain:

**DATA FORMAT (SPREADSHEET, DATABASE, etc.)**

**TREND ANALYSIS PREPARED**

YES ☒ NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

Analysis of long-term data sets has not been performed since a cyclical monitoring program has only been in place since 2004. Where long-term data sets do exist for a few stations, analyses have not yet been completed.

**PUBLICATIONS PREPARED**

YES ☒ NO

**COPY TO RAP OFFICE**

YES ☒ NO

**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

In 2004, HCA developed an Aquatic Resource monitoring program, which will see the cyclical monitoring of 50 stations across HCA’s watersheds. Six stations that correspond with the HCA’s Provincial Water Quality Monitoring Network and flow gauge stations will be annually monitored to compare surface water quality trends with the fisheries monitoring results. The remaining stations are monitored on a 3 year basis.

**DATA CONTACT PERSON**

**NAME**

Shari Wiseman

**POSITION**

Ecologist

**DEPARTMENT/DIVISION**

Watershed Planning and Engineering

**AGENCY**

Hamilton Conservation Authority

**EMAIL**

swiseman@conservationhamilton.ca

**TELEPHONE**

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**ADDRESS**

838 Mineral Springs Road, PO Box 7099

**CITY**

Hamilton

**PROVINCE**

Ontario

**POSTAL CODE**

L9G 3L3

**FIRST INCLUDED IN CATALOGUE**

June 2004 – 1st Edition
Fish and Fish Habitat Monitoring – Spencer Creek Watershed (Hamilton Conservation Authority)
### Official Title of Monitoring Program
**Hamilton-Halton Watershed Stewardship Program – Tree planting and naturalization sites**

### Name of Organization
Hamilton Conservation Authority and Conservation Halton

### Description (What is being monitored)
Selected rehabilitation sites that have been planting and/or naturalized through the Hamilton-Halton Watershed Stewardship Program. The monitoring work will assist in determining how to plan for future years. For example, some sites may not require planting if it can be estimated that the rate of natural succession under certain conditions would be favourable. Statistics of landowner responses and activities will continue to be collected. Landowners are also encouraged to monitor wildlife on their using existing protocols.

### Sampling Protocol (e.g., number of samples, depth of sample, etc.)
Monitoring has been conducted since 1995 through qualitative observations of the success of planting projects. A photomonitoring approach has been adapted from Van Horn and Van Horn (1996). Quantitative measurements have been conducted at some selected sites along transects. Sites will continue to be monitored at 1 year, three to five year, and ten-year intervals after rehabilitation is initiated.


### Sampling Parameters (List)
- Tree planting success, survival rates, species composition

### Rationale (List Numbers if Applicable)
- RAP Recommendation EPI – 6, RM - 4
- Regulatory Requirement
- Delisting Objective
- Other - Identify/Describe

### Frequency of Monitoring (Identify Season/time of Year/time of Day/no. of times)
Each site on a 1, 3, 5, and 10 year cycle

### Next Monitoring Period (Identify Year)
Please see above - ongoing

### Location(s) of Sites - Please use Geographic X/Y Locations if Available
Map Attached
Available through HHWSP office at Hamilton Conservation Authority or Conservation Halton

### List Years(s) for Which Data was Collected
Since 1995

### Data Available to the Public Through Contact Person
- [X] YES
- [ ] NO

### Data Format (Spreadsheet, Database, etc.)
- [X] Spreadsheet
- [ ] Database
- [ ] Other

### Trend Analysis Prepared
- [X] YES
- [ ] NO
  Trends observed but not statistically

### Briefly Describe Results and Discussion
**Executive Summary of 2001 Report**
By the end of 2000 in the Hamilton-Halton watershed, over 190 landowners were provided with recommendations to implement various rehabilitation projects, which included establishing buffers, enhancing wetland and upland habitat, fencing cattle from creeks, constructing manure storage facilities, and controlling erosion. To date, 30,000 tree and shrub seedlings, and 11,300 herbaceous plants as well as seeds have been planted. As a result, over 11 km of riparian land and almost 44 hectares of upland and wetland are returning to their natural state or have undergone an activity to help restore natural components and functions.

All sites where rehabilitation activity was undertaken are called natural regeneration zones. Natural regeneration zones are areas where natural succession is allowed to occur or areas where natural succession has been enhanced/supplemented by planting.

Three methods of monitoring were used:
- a) Photographing the natural regeneration zone and surrounding landscape
- b) Photomonitoring specific locations within the natural regeneration zone. The photomonitoring method has been adapted from Van Horn and Van Horn (1996).
- c) Counting the number of living specimens of planted material in the natural regeneration zone
This report reviews 67 sites where natural succession was allowed to occur or planting in conjunction with natural succession was implemented. Upland and riparian sites were categorized into project types. A series of factors were identified and rated to assess whether the rehabilitation activities undertaken will achieve the goal of producing long term environmental benefits like improving and increasing the amount of upland and riparian habitat, and improving water quality.

Based on the monitoring results in upland sites of the Hamilton and Halton Watersheds, allowing natural succession to occur is the preferred approach to planting in many situations. When considering upland sites for planting, effort should be directed towards sites that will benefit most from the investment in money and labour, including tending after planting. At riparian or streamside sites, planting has the potential to be a slightly more successful approach than allowing natural succession to occur, especially in areas being invaded by reed canary grass.

The overall results of monitoring in 2000 indicate that natural succession is preferred to planting in improving a number of habitats. Therefore it is important to continue to retire land in and adjacent to natural areas and watercourses while focusing planting efforts on those areas that will benefit most from planting.

At the sites that were monitored in 2000 it was observed that, depending upon the conditions at upland sites, eastern white pine, eastern white cedar, green ash, silver maple, nannyberry and red osier dogwood have proven to be hardy. Depending on the conditions at riparian sites, with the exception of eastern white pine, and including black ash, green ash, silver maple, eastern white cedar, nannyberry and red osier dogwood have proven to be hardy.

The HHWSP's staff has been involved in most of the restoration projects and all of the monitoring. Percent survival rates of planted material have been used to assign a high, medium or low rating to the success of the approach used. The purpose of the HHWSP’s planting projects has been to complement the process of natural succession. The mix of deciduous and coniferous tree and shrub material planted depends on site conditions.

Site conditions are not the only factors in the design of the HHWSP’s planting projects. The HHWSP has relied on volunteer assistance to implement many of the projects. Also in order to protect deciduous seedlings from girdling, tree shelters that have been installed require maintenance. The HHWSP’s staff has observed that recommended maintenance of the planting sites, through watering and adjusting tree shelters, has generally not being undertaken by landowners. The increasing number of projects being implemented has made it difficult for the HHWSP’s staff to be tending sites on a regular basis. The results of planting would be more successful if more landowners maintained the planted material.

Perhaps reforestation of priority target areas would be achieved more quickly by densely planting coniferous seedlings in a plantation style, with mandatory maintenance by landowners to achieve a transition to a mixed forest.

The primary goal of restoration activities designed and implemented by the HHWSP is to produce long-term environmental benefits. The HHWSP provides recommendations regarding restoration to landowners on a case-by-case basis.

Annual Reports of the Hamilton Halton Watershed Stewardship Program include monitoring information. In 2001 the five year monitoring report of Tree Planting Projects undertaken through the HHWSP was produced and distributed to many, including other Areas of Concern in the Province. A presentation about the results and recommendations of this work was made at a GLSF Habitat Rehabilitation Workshop, in November of 2002. Copies of this five year report summarizing what species have been successful under different growing and site conditions may be obtained from the HHWSP office at the Hamilton Conservation Authority or Conservation Halton.

Monitoring will be ongoing. Monitoring of water quality changes as a result of HHWSP rehabilitation projects is coordinated through conducted through Hamilton Conservation Authority and Conservation Halton.

DATA CONTACT PERSON

NAME
Sheila O’Neal

POSITION
Acting Coordinator

DEPARTMENT/DIVISION
Watershed Stewardship

AGENCY
Hamilton Conservation Authority and Conservation Halton

EMAIL
soneal@conservationhamilton.ca or stewardship@hrca.on.ca

TELEPHONE
905-525-2181 x 164 or 905-336-1158 x 263

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CITY
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PROVINCE
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POSTAL CODE
L9G 3L3

FIRST INCLUDED IN CATALOGUE
June 2004 – 1st Edition
### Hamilton Harbour RAP Monitoring Catalogue: 2005

**January 2006**

<table>
<thead>
<tr>
<th>OFFICIAL TITLE OF MONITORING PROGRAM</th>
<th>Water Quality Monitoring – Cootes Paradise and Hendrie Valley System</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME OF ORGANIZATION</td>
<td>Royal Botanical Gardens</td>
</tr>
<tr>
<td>DESCRIPTION (WHAT IS BEING MONITORED)</td>
<td>In partnership with the City of Hamilton, various water quality parameters are measured for the water sources to the RBG nature sanctuaries as well as the resulting water, in the nature sanctuary marshlands.</td>
</tr>
<tr>
<td>SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)</td>
<td>10 stations in the Cootes Paradise system and 5 stations in the Hendrie Valley system are monitored on a biweekly basis between May and September. All sample sites are less than 2m deep.</td>
</tr>
<tr>
<td>SAMPLING PARAMETERS (LIST)</td>
<td>Water clarity, water temperature, air temperature, dissolved oxygen, recent precipitation, total phosphorus, total dissolved phosphorus, nitrate, nitrite, total ammonia, total suspended sediments, volatile suspended sediments, TKN, E.coli</td>
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<tr>
<td>RATIONALE (LIST NUMBER(S) IF APPLICABLE)</td>
<td>✗ RAP Recommendation WQ – 1a</td>
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<td>FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)</td>
<td>May and September on a biweekly basis</td>
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<tr>
<td>NEXT MONITORING PERIOD (IDENTIFY YEAR)</td>
<td>2006</td>
</tr>
<tr>
<td>LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE</td>
<td>Map Attached</td>
</tr>
<tr>
<td>LIST YEARS(S) FOR WHICH DATA WAS COLLECTED</td>
<td>Cootes Paradise from 1972 to 2005, Hendrie Valley System from 1999 to 2005</td>
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<td>DATA FORMAT (SPREADSHEET, DATABASE, etc.)</td>
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<td>TREND ANALYSIS PREPARED</td>
<td>YES</td>
</tr>
<tr>
<td>BRIEFLY DESCRIBE RESULTS AND DISCUSSION</td>
<td>Water clarity in the marshlands continues to improve, with water clarity in the spring months (May and June) averaging near 75 cm in 2003. However due to season shifts in the dominant water supply from the watersheds to STP plants, water clarity declines sharply by August when it averages about 35 cm in Cootes Paradise and part of the Hendrie Valley. Part of the Hendrie is protected from this water by berms and water clarity remains good in these areas. The problem is due to the hypereutrophic concentrations of nutrients discharged by the STP’s resulting in hypereutrophic conditions in the marshes and subsequent massive algae blooms. However, overall nutrient levels continue to show measurable declines. Water clarity and quality is also seriously impacted following rainstorms, due to extremely high suspended sediment concentrations (&gt;100mg/L). Heavy rainstorms will completely replace the marsh water with storm water within 24 hrs, resulting in serious damage to the flora and fauna of the nature sanctuary.</td>
</tr>
<tr>
<td>PUBLICATIONS PREPARED</td>
<td>✗ YES</td>
</tr>
<tr>
<td>PUBLICATIONS</td>
<td>• Project Paradise Annual Summary 2000, 2001, 2002</td>
</tr>
<tr>
<td>• The nutrient status of the Cootes Paradise Nature Sanctuary – 2001</td>
<td></td>
</tr>
<tr>
<td>FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES</td>
<td>Issues – Estrogen mimicking compounds in the STP effluent and the effect on the flora and fauna of the nature sanctuaries.</td>
</tr>
</tbody>
</table>

**47**
Water Quality Monitoring – Cootes Paradise and Hendrie Valley System (RBG)
## OFFICIAL TITLE OF MONITORING PROGRAM

**The Fishway**

### NAME OF ORGANIZATION

RBG

### DESCRIPTION (WHAT IS BEING MONITORED)

Environmental parameters and fish community

### SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)

Fishway operation occurs from March to October. For each lift of the fish cages, various environmental parameters and all fish caught are documented.

### SAMPLING PARAMETERS (LIST)

Environmental parameters - water clarity, water temp., air temp., dissolved oxygen, precipitation, water movement, water level.

Fish parameters - number of small fish (<25cm), and large fish (>25cm) by species. Length, weight and health of a subsample of the large fish.

### RATIONALE (LIST NUMBER(S) or REGULATION IF APPLICABLE)

- RAP Recommendation
- Regulatory Requirement - Not specified
- Delisting Objective
- Other - Identify/Describe

### FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)

March to October

### NEXT MONITORING PERIOD (IDENTIFY YEAR)

2006

### LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE

- Map Attached
- Desjardin Canal between Cootes Paradise Marsh and Burlington Bay

### LIST YEARS(S) FOR WHICH DATA WAS COLLECTED

1996 - 2005

### DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON

- YES
- NO

### DATA FORMAT (SPREADSHEET, DATABASE, etc)

- YES
- NO

### TREND ANALYSIS PREPARED

- YES
- NO

### BRIEFLY DESCRIBE RESULTS AND DISCUSSION

Almost all migration of fish through the Fishway is associated with spawning runs into the marsh and/or associated tributaries. Overall the number of individuals is increasing with totals for most species on average quadrupling since the fishway began operation. Catfish species (brown bullhead and channel catfish) are the most abundant of the large fish (65% of total), with approximately 45,000 large fish handled in 2003. Gizzard shad (yoy) are the most of the small fish representing about 25% of the 50,000 small fish in 2003.

### PUBLICATIONS PREPARED

- YES
- NO

### PUBLICATIONS

- The Cootes Paradise Fishway - HHRAP workshop 2003
- The Cootes Paradise Fishway - RBG workshop 2003

### FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES

Issue - the online dams of lower Spencer Creek prevent many species from accessing most of the available spawning habitat. List includes - Salmon and trout species, sucker species, various darters, various minnows, walleye.
The Fishway (RBG)

Sample location is approximate
## Official Title of Monitoring Program

**Cootes Paradise Emergent Survey 2003 Protocol**

### Name of Organization
RBG

### Description (What is Being Monitored)
Emergent plant growth

### Sampling Protocol (E.g., Number of Samples, Depth of Sample, etc.)
The position of the vegetation "front" will be measured along transects, the number of which to be determined. The surveys will occur in the fall and early winter.

### Sampling Parameters (List)
Position of emergent vegetation "front" (and hence the percent change in emergent vegetation area). We may attempt to quantify the percent change by species.

### Rationale (List Number(s) If Applicable)
- RAP Recommendation FW-9, RM-1
- Delisting Objective xiv

### Frequency of Monitoring (Identify Season/Time of Year/Time of Day/No. of Times)
Once annually, in the late fall or early winter

### Next Monitoring Period (Identify Year)
**RAP Office Note:** Unknown due to staffing changes at the RBG

### Location(s) of Sites - Please Use Geographic X/Y Locations If Available
Map Attached

### List Years for Which Data Was Collected
Ongoing

### Data Available to the Public Through Contact Person
- **YES**
- **NO**  
  *If No Please Explain:

### Trend Analysis Prepared
- **YES**
- **NO**

### Briefly Describe Results and Discussion
Data are not yet available. The 2003 Protocol differs from prior emergent surveys which attempted to map each emergent plant community. Justification for the protocol change can be found in the 2002 Project Paradise Season Review document.

### Publications Prepared
- **YES**
- **NO**

### Copy to RAP Office
- **YES**
- **NO**

### Future Monitoring – Identify Any Known Programs that are in the Development Stage or Should be Considered to Answer Emerging Issues
The surveys will be summarized in publication format over the winter season.

### Data Contact Person

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<th>Name</th>
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### Metadata Last Updated (YYYY-MM)
2003

**First Included in Catalogue**
June 2004 – 1st Edition
### Cootes Paradise Submergent Survey 2003 Protocol

**OFFICIAL TITLE OF MONITORING PROGRAM**

**Cootes Paradise Submergent Survey 2003 Protocol**

**NAME OF ORGANIZATION**

RBG

**DESCRIPTION (WHAT IS BEING MONITORED)**

Submergent macrophytes

**SAMPLING PROTOCOL (E.G., NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

Percent cover by species determined for 34 1x1m quadrats randomly placed within particular habitat polygons, twice per year. These quantitative data are supplemented by photomonitoring and qualitative habitat status descriptions.

**SAMPLING PARAMETERS (LIST)**

Percent cover/species.

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation FW-9, RM-1
- Delisting Objective xiv
- Regulatory Requirement
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Twice annually; once in summer, once in fall

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

RAP Office Note: Unknown due to staffing changes at the RBG

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**

Ongoing

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- YES
- NO

**DATA FORMAT (SPREADSHEET, DATABASE, etc.)**

- TREND ANALYSIS PREPARED

- YES
- NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

Data are not yet available. The 2003 Protocol differs from prior submergent surveys which utilized a transect approach. Justification for the protocol change can be found in the 2002 Project Paradise Season Review document.

**PUBLICATIONS PREPARED**

- YES
- NO

**PUBLICATIONS**

The surveys will be summarized in publication format over the winter season.

**DATA CONTACT PERSON**

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**METADATA LAST UPDATED (YYYY-MM)**

2003

**FIRST INCLUDED IN CATALOGUE**

June 2004 – 1st Edition
**OFFICIAL TITLE OF MONITORING PROGRAM**

**Hamilton Harbour RAP Monitoring Catalogue : 2005**

**Grindstone Emergent Survey 2003 Protocol**

**NAME OF ORGANIZATION**
RBG

**DESCRIPTION (WHAT IS BEING MONITORED)**
Emergent plant growth

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, ETC.)**
The position of the vegetation "front" will be measured along transects, the number of which to be determined. The surveys will occur in the fall and early winter.

**SAMPLING PARAMETERS (LIST)**
Position of emergent vegetation "front" (and hence the percent change in emergent vegetation area). We may attempt to quantify the percent change by species.

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**
- RAP Recommendation  RM-1
- Delisting Objective  xiv
- Regulatory Requirement
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**
Once annually, in the late fall or early winter

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**
RAP Office Note:  Unknown due to staffing changes at the RBG

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**
Map Attached  Includes Long Pond

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**
Ongoing

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**
YES  NO

**DATA FORMAT (SPREADSHEET, DATABASE, ETC.)**

**TREND ANALYSIS PREPARED**
YES  NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**
Data are not yet available. The 2003 Protocol differs from prior emergent surveys which attempted to map each emergent plant community. Justification for the protocol change can be found in the 2002 Project Paradise Season Review document.

**PUBLICATIONS PREPARED**
YES  NO

**PUBLICATIONS**
The surveys will be summarized in publication format over the winter season.

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**FIRST INCLUDED IN CATALOGUE**
June 2004 – 1st Edition
**Grindstone Submergent Survey 2003 Protocol**

**RBG**

**SUBMERGENT MACROPHYTES**

Percent cover by species determined for 41 1x1m quadrats randomly placed within particular habitat polygons, twice per year. These quantitative data are supplemented by photomonitoring and qualitative habitat status descriptions.

**Rationale (list number(s) if applicable)**

- [ ] RAP Recommendation  RM-1
- [x] Delisting Objective  xiv
- [ ] Regulatory Requirement
- [ ] Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Twice annually; once in summer, once in fall

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

- RAP Office Note:  Unknown due to staffing changes at the RBG

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

- Map Attached
- Includes Long Pond. 13 quadrats in Long Pond; 4 in Sunfish Pond; 4 in Blackbird Marsh; 6 in Osprey Marsh; 4 in Pond One; 3 in Pond Two; 3 in Pond 3; 4 in Pond 4

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- [x] Yes  [ ] No

**TREND ANALYSIS PREPARED**

- [ ] Yes  [x] No

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

Data are not yet available. The 2003 Protocol differs from prior submergent surveys which utilized a transect approach. Justification for the protocol change can be found in the 2002 Project Paradise Season Review document.

**PUBLICATIONS PREPARED**

- [x] Yes  [ ] No

**PUBLICATIONS**

The surveys will be summarized in publication format over the winter season.

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**Metadata Last Updated (YYYY-MM)**

- 2003

**First Included in Catalogue**

- June 2004 – 1st Edition
**OFFICIAL TITLE OF MONITORING PROGRAM**

**Incidental Vegetation Monitoring**

**NAME OF ORGANIZATION**

RBG

**DESCRIPTION (WHAT IS BEING MONITORED)**

Plant species and communities on RBG property

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, ETC.)**

RBG attempts to keep track of changes in our flora through the observations of the Field Botanist and other interested parties. The flora is summarized in a soon-to-be published checklist, updating Pringle (1969). Observations are recorded during property tours, and in the course of specific projects on site. The vast majority of records are vouchered with a herbarium specimen stored at HAM.

**SAMPLING PARAMETERS (LIST)**

Vascular plant species, both terrestrial and aquatic.

**RATIONALE (LIST NUMBERS IF APPLICABLE)**

- RAP Recommendation
- Regulatory Requirement
- Delisting Objective
- Other - Identify/Describe Herbarium Records

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Once annually, in the late fall or early winter

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

RAP Office Note: Unknown due to staffing changes at the RBG

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached

Cootes Paradise - North Shore; Cootes Paradise - South Shore; Hendrie Valley; Long Pond; Mercer's Glen; Rock Chapel; Berry Tract.

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- YES
- NO

**TREND ANALYSIS PREPARED**

- YES
- NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

The flora of RBG is one of the best-studied in Ontario.

**PUBLICATIONS PREPARED**

- YES
- NO

**PUBLICATIONS**

Pringle (1969). And a draft checklist (Smith, unpublished) is available upon special request, and is scheduled for publication this fall.

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**METADATA LAST UPDATED (YYYY-MM)**

2003

**FIRST INCLUDED IN CATALOGUE**

June 2004 – 1st Edition
**OFFICIAL TITLE OF MONITORING PROGRAM**

**Odonate Survey**

**NAME OF ORGANIZATION**

RBG

**DESCRIPTION (WHAT IS BEING MONITORED)**

Odonate (dragonfly and damselfly) populations

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

Sightings are recorded incidentally to other activities, and through focused efforts, i.e. day-long Odonate Counts.

**SAMPLING PARAMETERS (LIST)**

Species, numbers

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- Regulatory Requirement
- Other - Identify/Describe Ontario Odonata summary of the Toronto Entomologists’ Club

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Throughout flight season

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

**RAP Office Note: Unknown due to staffing changes at the RBG**

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached

Throughout watershed, but focussed on RBG properties

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**

2003

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

YES ☑ NO ☐ IF NO PLEASE EXPLAIN:

**TREND ANALYSIS PREPARED**

YES ☑ NO ☐

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

Data collected form part of a larger dataset published annually in the Ontario Odonata summary of the Toronto Entomologists’ Club.

**PUBLICATIONS PREPARED**

YES ☑ NO ☐

**PUBLICATIONS**

Ontario Odonata (3 volumes to date); Woodduck and Ontario Insects articles in progress.

**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

**DATA CONTACT PERSON**

**NAME**

Tïs Theïsmeyer

**POSITION**

Aquatic Ecologist

**AGENCY**

Royal Botanical Gardens

**EMAIL**

ttheysmeyer@rbg.ca

**TELEPHONE**

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**METADATA LAST UPDATED (YYYY-MM)**

2003

**FIRST INCLUDED IN CATALOGUE**

June 2004 – 1st Edition
## OFFICIAL TITLE OF MONITORING PROGRAM

**Amphibian Metapopulation Enhancement**

### NAME OF ORGANIZATION

Royal Botanical Gardens

### DESCRIPTION (WHAT IS BEING MONITORED)

The project focuses on the preservation and promotion of Cootes Paradise amphibian populations at the landscape level through the provision of strategically placed breeding habitat.

### SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)

Ephemeral ponds are created in suitable habitat that is connected to existing used amphibian breeding ponds by traversable habitat. Ponds are created at a suitable depth to retain water throughout the amphibian breeding season and throughout the period of transformation into adults. When necessary they are planted with appropriate native aquatic vegetation.

### SAMPLING PARAMETERS (LIST)

The created ponds are monitored for water retention, aquatic vegetation growth, amphibian use, and breeding and transformation success.

### RATIONALE (LIST NUMBER(S) IF APPLICABLE)

- RAP Recommendation: FW-1, RM-1
- Delisting Objective: iii, xiv
- Regulatory Requirement
- Other - Identify/Describe

### FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)

Two projects have so far been constructed along the north shore of Cootes Paradise. One is in Hickory Valley, the other along Homestead Trail in the Pinetum area.

### NEXT MONITORING PERIOD (IDENTIFY YEAR)

RAP Office Note: Unknown due to staffing changes at the RBG

### LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE

Map Attached

### LIST YEAR(S) FOR WHICH DATA WAS COLLECTED

1995, 2000

### DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON

- YES
- NO

### TREND ANALYSIS PREPARED

- YES
- NO

### BRIEFLY DESCRIBE RESULTS AND DISCUSSION

Ten of fifteen historically occurring species of amphibian became extirpated from Cootes Paradise. The development and encroachment of roadways and urban areas surrounding the marsh, and consequent disruption of amphibians on a landscape level, played no small role in this occurrence.

The provision of quality ephemeral breeding sites for amphibians within the Cootes Paradise area will go far in preserving their populations within the marsh, and make them more resilient to threats that may otherwise cause their extirpation.

Avenues to promote the colonization of Cootes Paradise by previously extirpated amphibian species from extant outside sources by the construction of appropriately placed ponds and travel corridors are being investigated.

### PUBLICATIONS PREPARED

- YES
- NO

### PUBLICATIONS

- Annual Cootes Paradise Season Reviews

### FUTURE MONITORING - IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES

A further habitat construction project (in part) is underway along Long Valley Brook, and two more are being developed for Westdale Ravine and in the western portion of Cootes Paradise.
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![Amphibian Metapopulation Enhancement Sites](image-url)
**Turtle Inventory of Carroll’s Bay**

**OFFICIAL TITLE OF MONITORING PROGRAM**

Turtle Inventory of Carroll’s Bay

**NAME OF ORGANIZATION**

Royal Botanical Gardens

**DESCRIPTION (WHAT IS BEING MONITORED)**

The species and numbers of turtles found within Carroll’s Bay, particularly along the western shore were inventoried.

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, ETC.)**

Follows a standard mark-recapture protocol developed by RBG Science staff. Six sites within Carroll’s Bay, four along the western shore and two along the eastern were monitored through the use of standard hoop traps.

**SAMPLING PARAMETERS (LIST)**

Individual turtles were captured, marked -through the filing of scutes in a pre-determined pattern where applicable – and released. Eastern Spiny Softshell (*Apalone spinifera*) were individually identified through the presence of distinguishing scars and Common Snapping Turtle (*Chelydra serpentina*) through the insertion of PIT tags in the fleshy tissue above the right posterior leg. The species, location, carapace length and width, gender, and identifying marks of each individual were recorded.

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation RM-1
- Regulatory Requirement
- Delisting Objective
- Other – RBG project to provide documentation on the presence of species at risk within the Carroll’s Bay region.

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Trapping was performed daily from mid-May through to the end of August. Each site was monitored for two weeks, with the erected traps being emptied daily. After the completion of trapping at a site, a new site was chosen and the traps erected there. All traps were checked during the day, usually by 9:00am.

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

RAP Office Note: Unknown due to staffing changes at the RBG

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

Map Attached  Carroll’s Bay

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**

2003

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- YES
- NO

**DATA FORMAT (SPREADSHEET, DATABASE, ETC.)**

- YES
- NO

**TREND ANALYSIS PREPARED**

- YES
- NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

The presence of two species at risk was confirmed for Carroll’s Bay through the trapping effort. A single female Eastern Spiny Softshell was captured in June, and a large population of Northern Map Turtle (*Graptemys geographica*), estimated at over 200, was discovered centered on the spit marsh north of the canal opening into Cootes Paradise. An alarming number of non-native Red-Eared Slider (*Trachemys scripta*) were also encountered.

A number of the turtles captured had suffered previous injury due to collision with boats or other forms of vehicular traffic. Due to the presence of two species at risk within Carroll’s Bay the use of boat motors should be prohibited.

**PUBLICATIONS PREPARED**

- YES
- NO

**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

The redesignation of Carroll’s Bay into a true sanctuary should be contemplated due to the presence of at least two turtle species at risk. This should include the prohibition of boat motor use within the sanctuary, and the curtailment of angling.
**DATA CONTACT PERSON**

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**METADATA LAST UPDATED (YYYY-MM)**

2003

**FIRST INCLUDED IN CATALOGUE**

June 2004 – 1st Edition

Sampling location is approximate
# Monitoring of Colonial Waterbird Nesting within Cootes Paradise/Carroll’s Bay

**OFFICIAL TITLE OF MONITORING PROGRAM**
Monitoring of Colonial Waterbird Nesting within Cootes Paradise/Carroll’s Bay

**NAME OF ORGANIZATION**
Royal Botanical Gardens

**DESCRIPTION (WHAT IS BEING MONITORED)**
The numbers of nests of colonial waterbirds are counted in season throughout Cootes Paradise and Carroll’s Bay.

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**
Visual count of waterbird nests at colonies located at Hickory Island in Cootes Paradise and Carroll’s Point within Hamilton Harbour. Coordinated with Canadian Wildlife Service count covering the rest of Hamilton Harbour.

**SAMPLING PARAMETERS (LIST)**
Individual nests of Double-Crested Cormorant (*Phalacrocorax auritus*) and Ring-Billed Gull (*Larus delawarensis*) are recorded. Other species will be added when appropriate.

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**
- RAP Recommendation RM-1
- Delisting Objective iii
- Regulatory Requirement
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**
Performed once annually in late June at date chosen in advance by CWS staff. Timing for RBG count is 8:30 am.

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**
Unknown due to staffing changes at the RBG

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**
- Hickory Island, Carroll’s Point

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**
1995 - 2003

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

**DATA FORMAT (SPREADSHEET, DATABASE, etc)**

**TREND ANALYSIS PREPARED**

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**
Double-Crested Cormorants began nesting on Hickory Island in 1995. Despite several efforts to discourage nesting over habitat destruction concerns, the number of nests continued to increase, peaking at 202 in 1999. Numbers are now subsiding as the vegetation substrate in which they nest is dying off due to excessive nutrification. Ring-Billed Gulls successfully nested on Hickory Island for the first time in 2003.

Carroll’s Point held a small number of Double-Crested Cormorant nests in 1997 and 1998. The colony was abandoned for unknown reason until 2002, when they commenced nesting again.

**PUBLICATIONS PREPARED**

**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**
The nesting of both Double-Crested Cormorants and Ring-Billed Gulls should continue as both species present habitat risks.

**DATA CONTACT PERSON**

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Tys Theysmeyer

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**METADATA LAST UPDATED (YYYY-MM)**

**FIRST INCLUDED IN CATALOGUE**
June 2004 – 1st Edition
Sampling location is approximate
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<th>OFFICIAL TITLE OF MONITORING PROGRAM</th>
<th>Fall Migratory Waterbird Inventory</th>
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<td>NAME OF ORGANIZATION</td>
<td>Royal Botanical Gardens</td>
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<tr>
<td>DESCRIPTION (WHAT IS BEING MONITORED)</td>
<td>The numbers of migratory waterbirds are monitored within Cootes Paradise, Hendrie Valley/Grindstone Creek areas, and portions of the western shore of Hamilton Harbour.</td>
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<td>SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)</td>
<td>Follows a standard monitoring protocol developed by RBG Science staff. Six sites within Cootes Paradise, a single site encompassing the Hendrie Valley, three sites within the Grindstone Estuary and three sites covering portions of western Hamilton Harbour are visually monitored.</td>
</tr>
<tr>
<td>SAMPLING PARAMETERS (LIST)</td>
<td>The waterbird species monitored are waterfowl, loons, grebes, rails, herons, gulls, terns, pelicans, kingfishers and raptors associated with aquatic environments. The species, location and number of individuals observed are recorded.</td>
</tr>
<tr>
<td>RATIONALE (LIST NUMBER(S) IF APPLICABLE)</td>
<td>☑ RAP Recommendation RM-1 ☐ Regulatory Requirement ☐ Delisting Objective iii ☑ Other - Identify/Describe</td>
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<tr>
<td>FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)</td>
<td>Performed weekly from mid-August to mid-November for a total of 12 observation events covering the peak fall migratory period. All sites are covered in a single day, commencing at 8:00 am and usually ending by 4:30 pm.</td>
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<td>NEXT MONITORING PERIOD (IDENTIFY YEAR)</td>
<td>RAP Office Note: Unknown due to staffing changes at the RBG</td>
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<td>LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE</td>
<td>Map Attached</td>
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<td>DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON</td>
<td>YES ☐ NO □ IF NO PLEASE EXPLAIN:</td>
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<tr>
<td>DATA FORMAT (SPREADSHEET, DATABASE, etc)</td>
<td>Trend Analysis Prepared</td>
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<tr>
<td>YES ☐ NO</td>
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<tr>
<td>BRIEFLY DESCRIBE RESULTS AND DISCUSSION</td>
<td>The number and diversity of waterbirds utilizing Cootes Paradise and surrounding environs as a stop-over site during fall migration has increased dramatically since the advent of the restoration project. Average waterbird numbers pre-restoration were 11216 individuals of 21 species annually. Post-restoration those numbers jump to 22184 individual waterbirds of 29 species. Improvements in water quality and increases in aquatic vegetative coverage have lead to a greater availability of food resources, which consequently permit more waterbird usage. While on the whole the increase in the number of waterbirds utilizing Cootes Paradise has been desirable, several trends may lead to difficulty. Long-term monitoring has shown increases in the number of non-native Mute Swan (Cygnus olor) throughout the region, and has revealed the rapid rise to dominance of the ecosystem for much of the fall season by Double-Crested Cormorant (Phalacrocorax auritus).</td>
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<tr>
<td>PUBLICATIONS PREPARED</td>
<td>Project Paradise Annual Field Season Review Reports</td>
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<td>COPY TO RAP OFFICE</td>
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<td>FUTURE MONITORING - IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES</td>
<td>Methods to restrict the numbers of Double-Crested Cormorants may be considered should their increase in numbers prove a problem. The control of non-native Mute Swan should be expanded to include the whole Hamilton Harbour basin and western Lake Ontario.</td>
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**Fall Migratory Waterbird Inventory Sites**

- Sampling location is approximate

![Map of Fall Migratory Waterbird Inventory Sites](image)
**OFFICIAL TITLE OF MONITORING PROGRAM**

**Canada Goose Local Breeding and Moult Migrant Monitoring**

**NAME OF ORGANIZATION**
Royal Botanical Gardens

**DESCRIPTION (WHAT IS BEING MONITORED)**
The number of breeding and moult migrant Greater Canada Geese (*Branta canadensis maxima*) are inventoried in Cootes Paradise and the Hamilton Harbour basin.

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**
Sites along Cootes Paradise and throughout the Hamilton Harbour basin are visually investigated for the presence of breeding and moult migrant Canada Geese.

**SAMPLING PARAMETERS (LIST)**
The number of individual geese, age (adult or juvenile) and location observed is recorded.

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- ☑ **RAP Recommendation** FW-5, RM-1
- ☐ Regulatory Requirement
- ☐ Delisting Objective
- ☐ Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**
Performed on a single day in late June that coincides with the presence of both moult migrants and local geese that have broods.

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**
**RAP Office Note**: Unknown due to staffing changes at the RBG

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**
Map Attached

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**
2003

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- ☑ YES
- ☐ NO

**DATA FORMAT (SPREADSHEET, DATABASE, etc)**

- ☑ TREND ANALYSIS PREPARED
- ☐ NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**
A recommendation of the RAP. This year was the first of what is envisioned to be an annual count.

**PUBLICATIONS PREPARED**

- ☐ YES
- ☑ NO

**COPY TO RAP OFFICE**

- ☑ YES
- ☐ NO

**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

---

**DATA CONTACT PERSON**

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**METADATA LAST UPDATED (YYYY-MM)**
2003

**FIRST INCLUDED IN CATALOGUE**
June 2004 – 1st Edition
### OFFICIAL TITLE OF MONITORING PROGRAM
**Calling Amphibian Monitoring Programme**

### NAME OF ORGANIZATION
Royal Botanical Gardens

### DESCRIPTION (WHAT IS BEING MONITORED)
The populations of calling amphibians are monitored within Cootes Paradise, and the Hendrie Valley/Grindstone Creek areas.

### SAMPLING PROTOCOL (E.G., NUMBER OF SAMPLES, DEPTH OF SAMPLE, ETC.)
Follows the Marsh Monitoring Programme – Calling Amphibian protocol developed by Bird Studies Canada and Canadian Wildlife Service. Six sites within Cootes Paradise, three sites within the Hendrie Valley and a single site within the Grindstone Estuary are monitored. These sites are broken into two routes of five sites each. The first route covers the southern and western portions of Cootes Paradise and the second covers northern Cootes Paradise and the Hendrie Valley/Grindstone Creek area. The listening period for each site is three minutes.

### SAMPLING PARAMETERS (LIST)
The species, number, and location of calling amphibians are mapped and recorded at the ten predetermined sites.

### RATIONALE (LIST NUMBER(S) IF APPLICABLE)
- RAP Recommendation RM-1
- Delisting Objective iii
- Other - Identify/Describe

### FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)
Performed three times annually concurring with the arrival of consistent nighttime temperatures of 5°, 10°, and 17° C. This temperature regime usually occurs in the months April and May. Monitoring commences 30 minutes after sunset and must be completed before midnight.

### NEXT MONITORING PERIOD (IDENTIFY YEAR)
**RAP Office Note:** Unknown due to staffing changes at the RBG

### LOCATION(S) OF SITES – PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE
Map Attached
- 6 sites - Cootes Paradise
- 3 sites - Hendrie Valley
- 1 site - Grindstone Estuary

### DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON
- YES
- NO

### DATA FORMAT (SPREADSHEET, DATABASE, ETC.)
- TREND ANALYSIS PREPARED
- YES
- NO

### BRIEFLY DESCRIBE RESULTS AND DISCUSSION
The diversity of calling amphibians recorded within Cootes Paradise has increased since 1997. Three species previously extirpated from the area (Grey Treefrog (*Hyla versicolor*), Wood Frog (*Rana sylvatica*) and Northern Spring Peeper (*Pseudacris triseriata*) have returned to the western portion of the marsh. Numbers remain lower than expected and fluctuate on an annual basis depending on prevalent water levels.

Both the high numbers and low diversity recorded throughout the Hendrie Valley sites remain fairly constant throughout the monitoring period. This is reflective of the secluded and sheltered nature of the Hendrie Valley sites for as the breeding sites remain protected to a degree from the extremes of Great Lakes water level fluctuations, new species have difficulty in colonizing the existing habitat through the lack of traversable access points.

### PUBLICATIONS PREPARED
- YES
- NO

### PUBLICATIONS
Annual Project Paradise Field Season Review Reports

### FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES
The creation of amphibian breeding habitat through RBG’s Amphibian Metapopulation Enhancement programme should be expanded, and the physical translocation and introduction of previously extirpated amphibian species from outside sources should be attempted when habitat conditions permit, providing natural recolonization is not possible.
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Sampling location is approximate

![Map of Hamilton Harbour with sampling sites marked]
**OFFICIAL TITLE OF MONITORING PROGRAM**

**Nesting Marshbird Monitoring Programme**

**NAME OF ORGANIZATION**

Royal Botanical Gardens

**DESCRIPTION (WHAT IS BEING MONITORED)**

The numbers of nesting marshbirds are monitored within Cootes Paradise, and the Hendrie Valley/Grindstone Creek areas.

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)**

Follows the Marsh Monitoring Programme – Nesting Marshbird protocol developed by Bird Studies Canada and Canadian Wildlife Service. Six sites within Cootes Paradise, three sites within the Hendrie Valley and a single site within the Grindstone Estuary are monitored. These sites are broken into two routes of five sites each. The first route covers the southern and western portions of Cootes Paradise and the second covers northern Cootes Paradise and the Hendrie Valley/Grindstone Creek area. There is a five-minute period of broadcasting prerecorded marshbird calls followed by a five minute listening period for each site.

**SAMPLING PARAMETERS (LIST)**

The species, number, location, and activity of all bird species visible and audible are mapped and recorded at the ten predetermined sites.

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation RM-1
- Delisting Objective iii
- Regulatory Requirement
- Other - Identify/Describe

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

Performed twice annually at least ten days apart during the peak period of marshbird nesting. Usually this occurs in late May and early June. Monitoring commences at 6:00pm and commences before sunset.

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

*RAP Office Note: Unknown due to staffing changes at the RBG*

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

- Map Attached
- 6 sites - Cootes Paradise, 3 sites – Hendrie Valley, 1 site – Grindstone Creek Estuary

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**

1994 - 2003

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- Yes
- No

**DATA FORMAT (SPREADSHEET, DATABASE, etc)**

- Yes
- No

**TREND ANALYSIS PREPARED**

- Yes
- No

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

The diversity of marshbirds nesting within Cootes Paradise has increased since 1997 with the addition of Common Moorhen (*Gallinula chloropus*). Several species however, including Black Tern (*Chlidonias niger*) are still extirpated. Waterbird numbers are generally higher since the commencement of successful operations at the Cootes Paradise Fishway, but are still at disappointingly low levels. Annual fluctuations in number can be accounted for in part by differences in yearly water levels and through fluctuations in spring temperatures. Very high water levels tend to flood nesting sites while low water levels leave nesting sites too far from standing water to be successful. Unseasonably cold temperatures during the late spring tend to restrict the number of nesting attempts as well.

The Hendrie Valley has shown an increase in the number of nesting marshbirds since 2000. The geographically limited but high quality emergent vegetation has attracted regular nesting of Sora (*Porzana carolina*) and the occasional attempt by the threatened Least Bittern (*Ixobrychus exilis*).

**PUBLICATIONS PREPARED**

- Yes
- No

**PUBLICATIONS**

- Annual Project Paradise Field Season Review Reports

**COPY TO RAP OFFICE**

- Yes 1997-2002
- No pre-1997
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<tr>
<th>OFFICIAL TITLE OF MONITORING PROGRAM</th>
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<tr>
<td>Canada Goose and Mute Swan Population Control Programme</td>
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<th>NAME OF ORGANIZATION</th>
</tr>
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<tbody>
<tr>
<td>Royal Botanical Gardens</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESCRIPTION (WHAT IS BEING MONITORED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under permit with the Canadian Wildlife Service, the successful nesting of non-migratory Canada Geese (<em>Branta canadensis maxima</em>) and non-native Mute Swan (<em>Cygnus olor</em>) is disrupted to enable long-term population reduction.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nests of non-migratory Canada Geese and non-native Mute Swan are searched out within Cootes Paradise, the Hendrie Valley and the Grindstone Estuary. Once found the eggs within each nest are spray-coated with Daedol 50N (an inert white mineral oil) to prevent hatching through the suffocation of the developing embryo.</td>
</tr>
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<thead>
<tr>
<th>RATIONALE (LIST NUMBER(S) IF APPLICABLE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ RAP Recommendation FW-5</td>
</tr>
<tr>
<td>☐ Regulatory Requirement</td>
</tr>
<tr>
<td>☐ Delisting Objective</td>
</tr>
<tr>
<td>☐ Other - Identify/Describe</td>
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<table>
<thead>
<tr>
<th>FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performed continuously from March through May annually. There are three main biweekly efforts commencing the beginning of April.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NEXT MONITORING PERIOD (IDENTIFY YEAR)</th>
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</thead>
<tbody>
<tr>
<td>RAP Office Note: Unknown due to staffing changes at the RBG</td>
</tr>
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<table>
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<tr>
<th>LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map Attached Cootes Paradise, the Hendrie Valley and the Grindstone Estuary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIST YEAR(S) FOR WHICH DATA WAS COLLECTED</th>
</tr>
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<tbody>
<tr>
<td>1993 - 2003</td>
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<table>
<thead>
<tr>
<th>DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ YES ☐ NO If NO PLEASE EXPLAIN: Public sensitivity has caused controversy in the past.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATA FORMAT (SPREADSHEET, DATABASE, etc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ TREND ANALYSIS PREPARED</td>
</tr>
<tr>
<td>☐ NO</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>BRIEFLY DESCRIBE RESULTS AND DISCUSSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>The number of controlled nests and eggs of non-migratory Canada Geese has remained relatively constant over the years while the number of recorded individual adults recorded at RBG has declined marginally. While seemingly of minor effect, the 30% annual increase in non-migratory Canada Goose populations experienced in other urban areas has been avoided.</td>
</tr>
</tbody>
</table>

The non-native Mute Swan population nesting within Cootes Paradise and the Hendrie Valley/Grindstone Creek area has tripled since 1998 despite increases in the number of nests and individual eggs oiled. As RBG is one of the few organizations attempting the control of Mute Swan within the Hamilton Harbour basin, it is likely these increases in population experienced by RBG are coming from outside RBG administrative boundaries.

<table>
<thead>
<tr>
<th>PUBLICATIONS PREPARED</th>
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<tbody>
<tr>
<td>☑ YES ☐ NO</td>
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<table>
<thead>
<tr>
<th>PUBLICATIONS</th>
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</thead>
<tbody>
<tr>
<td>Annual Project Paradise Field Season Review Reports</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COPY TO RAP OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ YES 1997-2002 ☐ NO pre-1997</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FUTURE MONITORING - IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>The areas throughout which the control of nesting non-migratory Canada Geese and non-native Mute Swan is practiced should be expanded to encompass the entire Hamilton Harbour basin, and much of western Lake Ontario.</td>
</tr>
</tbody>
</table>
**DATA CONTACT PERSON**

<table>
<thead>
<tr>
<th>NAME</th>
<th>POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tys Theysmeyer</td>
<td>Aquatic Ecologist</td>
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<tr>
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</tr>
<tr>
<td>TELEPHONE</td>
<td>905-527-1158 x 251</td>
</tr>
<tr>
<td>FAX</td>
<td>905-577-0375</td>
</tr>
<tr>
<td>ADDRESS</td>
<td>PO Box 399</td>
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<tr>
<td>CITY</td>
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</tr>
<tr>
<td>PROVINCE</td>
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</tr>
<tr>
<td>POSTAL CODE</td>
<td>L8N 3H8</td>
</tr>
</tbody>
</table>

**METADATA LAST UPDATED (YYYY-MM)**

2003

**FIRST INCLUDED IN CATALOGUE**

June 2004 – 1st Edition

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Waterbird Population Control Sites
Non-Migratory Canada Goose
Mute Swan

Sampling location is approximate
## Official Title of Monitoring Program

### Wildlife Vehicular Mortality Study of Cootes Drive

### Name of Organization

Royal Botanical Gardens

### Description (What is being monitored)

The species and numbers of wildlife killed by vehicular traffic along Cootes Drive were inventoried.

### Sampling Protocol (E.g. Number of Samples, Depth of Sample, etc.)

Follows a transect-based protocol developed by RBG Science staff. Thirty 100’ transects were located along both the eastbound and westbound lanes of Cootes Drive, giving a total of sixty transects. Transects were walked and cadavers removed when encountered.

### Sampling Parameters (List)

Individual deceased birds, mammals, and herpetiles encountered were identified as to species, age, and gender. This information, plus the location of the cadaver, was then recorded.

### Rationale (List Numbers if Applicable)

- RAP Recommendation
- Delisting Objective
- **Regulatory Requirement** Other – RBG project to determine the risk of roadways to adjacent wildlife populations.

### Frequency of Monitoring (Identify Season/Time of Year/Time of Day/No. of Times)

The transects were monitored three times per week from April through to September. Transects were checked sequentially either late morning or early afternoon.

### Next Monitoring Period (Identify Year)

**RAP Office Note: Unknown due to staffing changes at the RBG**

### Location(s) of Sites – Please Use Geographic X/Y Locations if Available

Map Attached

**List Year(s) for Which Data was Collected**


### Data Available to the Public through Contact Person

- **YES**  
- NO  

If NO please explain:

### Trend Analysis Prepared

- **YES**  
- NO

### Briefly Describe Results and Discussion

It has long been suspected that vehicular traffic, along with associated urban developments, have played a part in the extirpation of many of the amphibian species once found in Cootes Paradise. In addition, several turtle species, including the declining Blanding’s Turtle (*Emydoidea blandingii*) are placed at risk due to the proximity of this major roadway to the marsh due to their propensity to use the gravel road margins as nesting habitat. Nesting females and newly emergent hatchlings are both prone to vehicular related mortality.

The results of the study have been alarming. In the 1999 study period alone 80 deceased turtles were found along Cootes Drive, including 66 Common Snapping Turtles (*Chelydra serpentina*), 11 Midland Painted Turtles (*Chrysemys picta marginata*) and a Blanding’s Turtle. Large numbers of amphibians were also recorded, particularly after rain events when hundreds of juveniles are encouraged to disperse and consequently become casualties to vehicle traffic.

A method to limit the impact of Cootes Drive upon adjacent wildlife populations should be considered lest some species be driven to extirpation.

### Publications Prepared

- **YES**  
- NO

### Publications

- Cootes Paradise Annual Season Review
- Pappus Article
- Northeast Natural History VII Conference Abstract
A redesign of the Cootes Drive roadbed may be necessary to minimize vehicular impacts upon herpetile populations in the adjacent marshland. Additionally, nesting substrate for turtles should be constructed and placed away from vehicular traffic so that negative impacts to adjacent turtle populations can be avoided.

DATA CONTACT PERSON

<table>
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<tbody>
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<td>Ontario</td>
<td>L8N 3H8</td>
</tr>
</tbody>
</table>

FIRST INCLUDED IN CATALOGUE

June 2004 – 1st Edition

Sampling location is approximate
**OFFICIAL TITLE OF MONITORING PROGRAM**

**Turtle Nesting Habitat Creation and Monitoring Project**

**NAME OF ORGANIZATION**

Royal Botanical Gardens

**DESCRIPTION (WHAT IS BEING MONITORED)**

The usage of artificial turtle nesting substrates created in the Laking Garden, along with the fate of any subsequent nests, was monitored. These beds were created in an effort to reduce vehicle-related mortality amongst nesting female turtles by providing suitable nesting substrate away from traffic.

**SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, ETC.)**

RBG developed protocol utilizing a remote digital camera array triggered by motion.

**SAMPLING PARAMETERS (LIST)**

A remote digital camera was placed over-watching the larger turtle nesting bed created in the Laking Garden. Images of any creature triggering the camera were captured.

**RATIONALE (LIST NUMBER(S) IF APPLICABLE)**

- RAP Recommendation
- Regulatory Requirement
- Other – RBG initiative to determine if created turtle nesting beds were successful.

**FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)**

The remote digital camera array was operated on site from late May through to the end of August. Images were retrieved daily during the nesting season, and after every few days during the summer.

**NEXT MONITORING PERIOD (IDENTIFY YEAR)**

Uncertain (see future monitoring notes below)

**LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE**

- Map Attached
- Laking Garden on RBG Property

**LIST YEAR(S) FOR WHICH DATA WAS COLLECTED**

2003

**DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON**

- YES
- NO

**DATA FORMAT (SPREADSHEET, DATABASE, ETC.)**

- YES
- NO

**TREND ANALYSIS PREPARED**

- YES
- NO

**BRIEFLY DESCRIBE RESULTS AND DISCUSSION**

The large turtle nesting bed in the Laking Garden was used by at least one Common Snapping Turtle (*Chelydra serpentina*) proving the design is attractive to at least some turtles. Regrettably the digital camera array did not capture images of the turtle, nor could be used to monitor the fate of the nest, as the nest was dug directly behind the pole upon which the camera was mounted.

The fate of four Common Snapping Turtle clutches translocated to the nesting bed was successfully recorded however, with the predating Raccoons (*Procyon lotor*) being amply photographed.

Unfortunately the camera was stolen during late August, so the monitoring of hatchling emergence was not possible.

**PUBLICATIONS PREPARED**

- YES
- NO

**FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES**

It is doubtful whether this monitoring will be repeated in its current form, as the digital camera array will likely not be replaced. Future monitoring will be of a less technologically advanced nature.
## DATA CONTACT PERSON

<table>
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<td>Science</td>
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<td>METADATA LAST UPDATED (YYYY-MM)</td>
<td>2003</td>
</tr>
<tr>
<td>FIRST INCLUDED IN CATALOGUE</td>
<td>June 2004 – 1st Edition</td>
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### OFFICIAL TITLE OF MONITORING PROGRAM

**MISA Monitoring (Municipal-Industrial Strategy for Abatement)**

### NAME OF ORGANIZATION

Dofasco

### DESCRIPTION (WHAT IS BEING MONITORED)

Effluent sites representing all the direct water discharges to Hamilton Harbour

### SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)

Requirements vary

### SAMPLING PARAMETERS (LIST)

O.Reg. 214/95, Schedules 2, 3, 4, 5): flow, total cyanide, ammonia + ammonium, pH, total suspended solids, total lead, total zinc, phenolics, benzene, benzo(a)pyrene, naphthalene, oil and grease, acute lethality testing in rainbow trout and daphnia magna, chronic toxicity testing

### RATIONALE (LIST NUMBER(S) IF APPLICABLE)

- Regulatory Requirement Ontario Ministry of the Environment (EPA, O. Reg. 214/95)
- Other - Identify/Describe

### FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)

Requirements vary from 3 times/day, daily, weekly, monthly, quarterly and semi annual sampling

### NEXT MONITORING PERIOD (IDENTIFY YEAR)

2006

### LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE

Map Attached

<table>
<thead>
<tr>
<th>MISA Control Point</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0100</td>
<td>East Boat Slip Sewer</td>
<td>Cooling Water Effluent</td>
</tr>
<tr>
<td>0300</td>
<td>#1 Boiler House</td>
<td>Cooling Water Effluent</td>
</tr>
<tr>
<td>0400</td>
<td>West Bayfront Sewer</td>
<td>Merged Effluent</td>
</tr>
<tr>
<td>0600</td>
<td>Primary Wastewater Treatment Plant</td>
<td>Process Effluent</td>
</tr>
<tr>
<td>0800</td>
<td>Blast Furnace Recycle Blowdown</td>
<td>Process Effluent</td>
</tr>
<tr>
<td>1200</td>
<td>#2 Boiler House</td>
<td>Cooling Water Effluent</td>
</tr>
<tr>
<td>1101</td>
<td>#1 Acid Regeneration Plant</td>
<td>Process Effluent</td>
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<tr>
<td>1700</td>
<td>#2 Hot Mill &amp; Melt Shop Sewer</td>
<td>Cooling Water Effluent</td>
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<tr>
<td>2000</td>
<td>#2 Hot Mill Filtration Plant Blowdown</td>
<td>Process Effluent</td>
</tr>
<tr>
<td>2500</td>
<td>Electric Arc Furnace Cooling Water</td>
<td>Cooling Water Effluent</td>
</tr>
</tbody>
</table>

### DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON

YES ☒ NO ☐ If NO please explain: This information is available through reports sent to the MOE.

### TREND ANALYSIS PREPARED

☒ YES ☐ NO

### BRIEFLY DESCRIBE RESULTS AND DISCUSSION

See “Additional Monitoring for Hamilton Harbour RAP” form for this information

### PUBLICATIONS PREPARED

☒ YES ☐ NO

### PUBLICATIONS

This data is summarized in the Dofasco Annual MISA Report.

### FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES
### DATA CONTACT PERSON

<table>
<thead>
<tr>
<th>NAME</th>
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<th>EMAIL</th>
<th>TELEPHONE</th>
<th>FAX</th>
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</thead>
<tbody>
<tr>
<td>Sarodha Rajkumar</td>
<td>Environment Specialist</td>
<td><a href="mailto:sarodha_rajkumar@dofasco.ca">sarodha_rajkumar@dofasco.ca</a></td>
<td>905-548-7200 x 6113</td>
<td>905-548-4267</td>
</tr>
<tr>
<td>Environment Department</td>
<td>AGENCY: Dofasco</td>
<td></td>
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<tbody>
<tr>
<td>1400 Burlington Street East, PO Box 2460</td>
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<td>Ontario</td>
<td>L8N 2S5</td>
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<tr>
<td>2006-01</td>
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</table>

Sampling location is approximate
OFFICIAL TITLE OF MONITORING PROGRAM

Additional Monitoring for Hamilton Harbour RAP

NAME OF ORGANIZATION

Dofasco

DESCRIPTION (WHAT IS BEING MONITORED)

Effluent sites representing all the direct water discharges to Hamilton Harbour and the intake site, allowing for the calculation of net loads.

SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)

Requirements vary

SAMPLING PARAMETERS (LIST)

- MISA Parameters (O.Reg. 214/95, Schedules 2, 3, 4, 5): flow, total cyanide, ammonia + ammonium, pH, total suspended solids, total lead, total zinc, phenolics, benzene, benzo(a)pyrene, naphthalene, oil and grease, acute lethality testing in rainbow trout and daphnia magna, chronic toxicity testing
- total organic carbon, dissolved organic carbon, conductivity, iron, chromium, TKN, total phosphorus, chlorides, fluorides

RATIONALE (LIST NUMBER(S) IF APPLICABLE)

☑ RAP Recommendation  WQ – 1b, TSSR – 3
☐ Regulatory Requirement
☑ Delisting Objective  viii, xii
☐ Other - Identify/Describe Facility process control.

FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)

Varies from 3 times/day – semi annual sampling. Most MISA parameters sampled more than regulated requirements.

NEXT MONITORING PERIOD (IDENTIFY YEAR)

2006

LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE

☐ Map Attached

<table>
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<td>East Boat Slip Sewer</td>
<td>Cooling Water Effluent</td>
</tr>
<tr>
<td>0200</td>
<td>Ottawa Street Slip</td>
<td>Mixture of Dofasco and City of Hamilton discharges.</td>
</tr>
<tr>
<td>0300</td>
<td>#1 Boiler House</td>
<td>Cooling Water Effluent</td>
</tr>
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<td>2500</td>
<td>Electric Arc Furnace Cooling Water</td>
<td>Cooling Water Effluent</td>
</tr>
<tr>
<td>0500</td>
<td>North End of property between boatslip and Ottawa Street Slip</td>
<td>Baywater Intake</td>
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<tr>
<td>2700</td>
<td>#6 Pickle Line Cooling Water Discharge</td>
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<tr>
<td>2800</td>
<td>#2 Tandem Cooling Water Discharge</td>
<td>Cooling Water</td>
</tr>
</tbody>
</table>

LIST YEAR(S) FOR WHICH DATA WAS COLLECTED

1993 – 2005

DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON

☐ YES ☐ NO  IF NO PLEASE EXPLAIN: Data summarized in Dofasco Annual MISA Report.

DATA FORMAT (SPREADSHEET, DATABASE, etc)

☑ YES ☐ NO

TREND ANALYSIS PREPARED

☑ YES ☐ NO
BRIEFLY DESCRIBE RESULTS AND DISCUSSION

All the parameters reported on in the RAP loadings reports (ammonia, total phosphorus, total suspended solids, lead, iron, zinc, phenolics, cyanide, naphthalene, benzo(a)pyrene) have seen a decrease in the average net daily loading to Hamilton Harbour. Due to the use of net loadings to account for intake of Harbour water, some parameters actually are reported as a negative value; this occurs when the water Dofasco takes in from the Harbour has more of the contaminant in it than the water the industry returns to the Harbour.

PUBLICATIONS PREPARED


DATA CONTACT PERSON

- NAME: Sarodha Rajkumar
- POSITION: Environment Specialist
- DEPARTMENT/DIVISION: Environment Department
- AGENCY: Dofasco
- EMAIL: sarodha_rajkumar@dofasco.ca
- TELEPHONE: 905-548-7200 x 6113
- FAX: 905-548-4267
- ADDRESS: 1400 Burlington Street East, PO Box 2460
- CITY: Hamilton
- PROVINCE: Ontario
- POSTAL CODE: L8N 2S5
- METADATA LAST UPDATED (YYYY-MM): 2006-01
- FIRST INCLUDED IN CATALOGUE: June 2004 – 1st Edition

Sampling location is approximate
Hamilton Harbour RAP Monitoring Catalogue: 2005

OFFICIAL TITLE OF MONITORING PROGRAM

MISA Monitoring (Municipal-Industrial Strategy for Abatement)

NAME OF ORGANIZATION
Stelco Hamilton

DESCRIPTION (WHAT IS BEING MONITORED)
Effluent sites representing all the direct water discharges to Hamilton Harbour

SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, etc.)
Requirements vary

SAMPLING PARAMETERS (LIST)
O.Reg. 214/95, Schedules 2, 3, 4, 5: flow, total cyanide, ammonia + ammonium, pH, total suspended solids, total chromium, total lead, total zinc, phenolics, benzene, benzo(a)pyrene, naphthalene, oil and grease, acute lethality testing for rainbow trout and daphnia magna, chronic toxicity testing for fathead minnow growth inhibition and Ceriodaphnia dubia reproductive inhibition

RATIONALE (LIST NUMBER(S) IF APPLICABLE)

☑ RAP Recommendation
☐ Regulatory Requirement Ontario Ministry of the Environment (EPA, O. Reg. 214/95)
☐ Other - Identify/Describe

FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)
Requirements vary from 3 times/day, daily, weekly, monthly, quarterly and semi annual sampling

NEXT MONITORING PERIOD (IDENTIFY YEAR)
2006

LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE
Map Attached

<table>
<thead>
<tr>
<th>MISA Control Point</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0100</td>
<td>West Side Open Cut</td>
<td>Cooling Water Effluent</td>
</tr>
<tr>
<td>0200</td>
<td>Northwest Outfall</td>
<td>Cooling Water Effluent</td>
</tr>
<tr>
<td>0400</td>
<td>North Outfall</td>
<td>Merged Effluent</td>
</tr>
<tr>
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<td>East Side Filter Plant</td>
<td>Process Effluent</td>
</tr>
<tr>
<td>0602</td>
<td>#1 60 Inch Sewer</td>
<td>Cooling Water Effluent</td>
</tr>
<tr>
<td>1100</td>
<td>#2 Rod Mill</td>
<td>Process Effluent</td>
</tr>
</tbody>
</table>

LIST YEAR(S) FOR WHICH DATA WAS COLLECTED
1993-2005

DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON
☑ YES ☐ NO IF NO PLEASE EXPLAIN

TREND ANALYSIS PREPARED
☑ YES ☐ NO

BRIEFLY DESCRIBE RESULTS AND DISCUSSION
See "Additional Monitoring for Hamilton Harbour RAP" form for this information

PUBLICATIONS PREPARED
☑ YES ☐ NO

PUBLICATIONS

FUTURE MONITORING – IDENTIFY ANY KNOWN PROGRAMS THAT ARE IN THE DEVELOPMENT STAGE OR SHOULD BE CONSIDERED TO ANSWER EMERGING ISSUES
<table>
<thead>
<tr>
<th>DATA CONTACT PERSON</th>
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<tbody>
<tr>
<td>NAME</td>
<td>Andrew Sebestyen</td>
</tr>
<tr>
<td>POSITION</td>
<td>Environment Manager</td>
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<td>FIRST INCLUDED IN CATALOGUE</td>
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Sampling location is approximate
OFFICIAL TITLE OF MONITORING PROGRAM
Additional Monitoring for Hamilton Harbour RAP

NAME OF ORGANIZATION
Stelco Hamilton

DESCRIPTION (WHAT IS BEING MONITORED)
Effluent sites representing all the direct water discharges to Hamilton Harbour and the intake site, allowing for the calculation of net loads.

SAMPLING PROTOCOL (E.G. NUMBER OF SAMPLES, DEPTH OF SAMPLE, ETC.)
Requirements vary

SAMPLING PARAMETERS (LIST)
• MISA Parameters (O.Reg. 214/95, Schedules 2, 3, 4, 5): flow, total cyanide, ammonia + ammonium, pH, total suspended solids, total chromium, total lead, total zinc, phenolics, benzene, benzo(a)pyrene, naphthalene, oil and grease, acute lethality testing for rainbow trout and daphnia magna, chronic toxicity testing for fathead minnow growth inhibition and Ceriodaphnia dubia reproductive inhibition
• total iron
• total phosphorus

RATIONALE (LIST NUMBER(S) IF APPLICABLE)
• RAP Recommendation WQ – 1b, TSSR – 3
• Delisting Objective viii
• Regulatory Requirement
• Other - Identify/Describe

FREQUENCY OF MONITORING (IDENTIFY SEASON/TIME OF YEAR/TIME OF DAY/NO. OF TIMES)
All additional monitoring (beyond MISA requirements) are performed weekly

NEXT MONITORING PERIOD (IDENTIFY YEAR)
2006

LOCATION(S) OF SITES - PLEASE USE GEOGRAPHIC X/Y LOCATIONS IF AVAILABLE
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<tr>
<td>1600</td>
<td># 2 Bayshore Pumphouse</td>
<td>Intake</td>
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LIST YEAR(S) FOR WHICH DATA WAS COLLECTED
1993 – 2005 (Total Iron collected since 1998)

DATA AVAILABLE TO THE PUBLIC THROUGH CONTACT PERSON
YES ☐ NO ☐ IF NO PLEASE EXPLAIN:

TREND ANALYSIS PREPARED
YES ☐ NO ☐

BRIEFLY DESCRIBE RESULTS AND DISCUSSION
All the parameters reported on in the RAP loadings reports (ammonia, total phosphorus, total suspended solids, lead, iron, zinc, phenolics, cyanide, naphthalene, benzo(a)pyrene) have seen a decrease in the average net daily loading to Hamilton Harbour. Due to the use of net loadings to account for intake of Harbour water, some parameters actually are reported as a negative value; this occurs when the water Stelco takes in from the Harbour has more of the contaminant in it than the water the industry returns to the Harbour.

PUBLICATIONS PREPARED
YES ☐ NO ☐

COPY TO RAP OFFICE
YES ☐ NO ☐
PUBLICATIONS

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