NIAGARA PENINSULA CONSERVATION AUTHORITY

NIAGARA PENINSULA CONSERVATION AUTHORITY

FULL AUTHORITY

WELLAND **AGENDA** **MAY 19, 2010 – 7:00 p.m.**

ROLL CALL

DECLARATION OF CONFLICT OF INTEREST

BUSINESS:

(1) MINUTES

(a) FULL AUTHORITY MEETING – APRIL 21, 2010

Attached are the Minutes of the Full Authority Meeting held April 21, 2010.

(b) NIAGARA REGION TREE AND FOREST CONSERVATION BY-LAW ADVISORY COMMITTEE MEETING – APRIL 15, 2010

Attached are the Minutes of the Niagara Region Tree and Forest Conservation By-law Advisory Committee meeting held April 15, 2010.

(2) BUSINESS ARISING FROM MINUTES

(3) CHAIRMAN'S REMARKS

(4) CAO'S REPORT

(5) CORRESPONDENCE

Attached is a copy of a letter of resignation received from Jeremy Bird a member of the Niagara Peninsula Conservation Foundation for your information.

(6) BUDGET STATUS REPORT TO APRIL 30, 2010 – REPORT NO. 24-10

Attached is Report No. 24-10 together with the Current and Capital Budget summaries regarding the status of the budget to April 30, 2010.

(7) 2009 WATER QUALITY MONITORING PROGRAM ANNUAL REPORT - REPORT NO. 25-10

Attached is Report No. 25-10 regarding this matter, together with a copy of the annual report. Staff will be in attendance to make a presentation.

(8) NIAGARA RIVER REMEDIAL ACTION PLAN STAGE 2 UPDATE - REPORT NO. 26-10

Attached is Report No. 26-10 regarding this matter together with a copy of the 2010 update report. Staff will be in attendance to make a presentation.

(9) TERMS OF EMPLOYMENT AND PERSONNEL REGULATIONS – REPORT NO. 27-10

Attached is Report No. 27-10 regarding this matter together with a copy of the current Personnel Policies with proposed changes.

(10) NPCA WETLAND POLICY REPORT – REPORT NO. 28-10

Attached is Report No. 28-10 regarding this matter.

(11) DSBN PROPOSAL – WOODEND CONSERVATION AREA – REPORT NO. 29-10

Attached is Report No. 29-10 regarding this matter.

(12) REGIONAL TREE AND FOREST CONSERVATION BY-LAW – REPORT NO. 30-10

Attached is Report No. 30-10 for your information.

(13) CONSERVATION AREA DIRECTIONAL SIGNAGE – REPORT NO. 31-10

Attached is Report No. 31-10 with respect to this matter.

(14) APPOINTMENT OF ENFORCEMENT OFFICERS – REPORT NO. 32-10

Attached is Report No. 32-10 with respect to these appointments.

(15) PROJECT STATUS REPORT - REPORT NO. 33-10

Attached is Report No. 33-10 regarding the status of Authority projects.

(16) IN-CAMERA

(a) Complaint and Violation Status Report: Report No. CR-11-10
(b) Tree By-Law Status Report – Report No. CR-12-10

(17) OTHER BUSINESS

ADJOURNMENT

NIAGARA PENINSULA CONSERVATION AUTHORITY
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ADVISORY COMMITTEE MEETING

NIAGARA REGION TREE AND FOREST CONSERVATION BY-LAW

Niagara Peninsula Conservation Authority

Main Office, Welland April 15, 2010 1:30 p.m.

MINUTES (Draft)

Members Present: H. Rempel (Thorold municipal rep)
J. Schonberger (Niagara South Federation of Agriculture)
D. Ransom (NPCA Board member)
K. Stayzer (Wainfleet municipal rep)
K. Durham (Niagara North Federation of Agriculture)
R. Miller (Pelham municipal rep)
F. Berardi (Niagara Falls municipal rep)

NPCA Staff Present: D. Baker, Director, Land Management
D. Drennan, Forester
J. Vlasman, Forestry Technician
T. D'Amario, CAO

Regrets: B. Baty (NPCA Board member)
B. Andres (NOTL municipal rep)
L. Campbell (Ecological and Environmental Advisory Committee)
P. Robertson (Niagara Woodlot Association)

BUSINESS:

1) Call to Order

The Chairman called the meeting to order at 1:36 p.m.

2) Accept/Review minutes of previous meeting (November 19, 2009)

MOVED BY: Joe Schonberger
SECONDED BY: Helmut Rempel
THAT: The minutes of the previous meeting, held November 19, 2009, be accepted as circulated

"CARRIED"

3) Review of Action Items from previous meeting (May 21, 2009)

Action Item 1-2009: *Paul Robertson to deliver comments from the woodlot association.* ***(Carried forward)***

Action Item 14-2009: *Dan Drennan will inquire and set up a presentation from NPCA restoration staff for a presentation to the committee at a future meeting.* ***(Carried forward)***

4) Status and Work Report

A copy of the work report was circulated to members with the agenda package. The floor was opened up to questions regarding specific items.

a) A question was raised regarding an item where a permit was required for harvesting for own-use. The harvesting occurred within the Niagara Escarpment Natural Area and the question was why the NEC would require a permit. Dan Drennan explained that the permit was required under the Regional Bylaw because the NEC lands triggered the Sensitive Natural Area clause which always requires a permit, even for own use. Good Forestry Practices Permits are regularly issued for PSW's.

b) A question was raised whether anyone has been taken to court for an infraction where their defence was that they were not notified that PSW had been identified on their land. A discussion ensued regarding the designation of PSW and other wetlands. Tony D'Amario said NAI staff can elaborate a wetland designation at a later meeting, however the designations themselves are prepared by the MNR not the NPCA.

Helmut Rempel inquired if that meeting could be larger in scope other than just an advisory committee meeting as there were other parties who would be interested to hear it.

Joe Schonberger added that there were successful appeals on record to reverse wetland designations by the MNR.

No other major issues or questions were raised.

5) Annual Summary Report

Dan Drennan presented a report detailing a summary of Bylaw activities undertaken in 2009. The report contained statistics regarding harvesting and permits, as well as the types and numbers of inquiries received by the NPCA. Also included was a conclusion outlining recommendations made by Dan Drennan and Jeff Vlasman based on their experience with the Bylaw this past year.

Ken Durham asked if this report was intended to fulfill the requirement to produce an annual report to the region as outlined in the service level agreement.

Darcy Baker responded that this report is merely statistical and does not constitute an official report of the committee. The official report can be derived from the report with some modifications and recommendations from the committee itself.

6) Election of Chair and Vice-Chair

This being the first meeting of 2010, Roger Miller declared the positions of chair and vice-chair vacant.

Joe Schonberger nominated Roger Miller to continue his roll as Chair, seconded by Helmut Rempel.

Ken Durham moves that nominations close.

Roger Miller accepts and will continue as Chair. Helmut Rempel moved that Albert Witteveen continues as Vice-Chair, Ken Durham. seconds.

Carried.

7) Scheduling of Next Meeting

It was discussed and decided that regularly (every two months) scheduled meetings are no longer necessary if there is no significant items to discuss. Helmut Rempel suggested that the timing of the next meeting be left to the NPCA to decide, unless there is an urgent matter in which the chair could call a meeting.

Several members of the group were strongly in favour of scheduling evening meetings as opposed to afternoon ones.

Ken Durham indicated he would still like to tour a woodlot in conjunction to a meeting if it is possible and suggested it be at the discretion of the Chair.

Dan Drennan and Jeff Vlasman will continue to mail out status reports regularly, regardless if a meeting is being called or not.

Roger Miller declared the next meeting will be held at a future date when agenda items and issues merit. Next meeting will be planned for early fall 2010.

8) Adjournment

MOVED BY: Joe Schonberger

THAT: this meeting do now adjourn. Received at 2:43 p.m.

"CARRIED"

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **The Chairman and Members of the Authority**

DATE: **May 13, 2010**

SUBJECT: **Budget Status Report - Report No. 24-10**

Attached is the budget status report for the period ending April 30, 2010.

As Conservation Areas are opening, the expenditures in those areas will more closely reflect the budget numbers in the coming months.

There are no significant variances to report at this time.

RECOMMENDATION:

That the Budget Status Report for the period ending April 30, 2010 be received.

Respectfully Submitted By: _____

Tony D'Amario, P. Eng. CAO/ Secretary-Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **The Chairman and Members of the Authority**

DATE: **May 20, 2009**

SUBJECT: **Water Quality Monitoring Program – 2009 Annual Report No. 25-10**

The purpose of this report is to present the Draft 2009 Water Quality Monitoring Program Report for the Board's consideration.

In 2009, Authority staff gathered and tested water samples from 13 groundwater monitoring wells, and 68 surface locations. The Authority has been conducting this program for the past 9 years and the program is financed primarily from the Region of Niagara, with some minor funding from the Ministry of Environment. In addition, the program also periodically completes special projects that are funded by other interested agencies.

The intent of the program is to document the trends in both surface and subsurface water quality from both a chemical (metals, nutrients, suspended solids, etc.) and biological (leeches, larval stage dragonflies, crayfish, etc.) perspective, on some of the Niagara Peninsula's more significant watersheds. In general, the 2009 study found that most of the surface water stations tested had poor or impaired water quality. The likely causes are both point sources (i.e. combined sewer overflows, direct storm roadway outlets) and non point sources (i.e. agricultural/ livestock land runoff, faulty septic systems). Groundwater samples by and large meet accepted standards however, exceedances of boron, selenium, sodium, fluoride and nitrate were identified at various wells and/or in select samples. While mineral exceedances are generally thought to be attributed to natural groundwater conditions, nitrate exceedances are attributed to human activities such as agricultural land uses or faulty septic systems. Unfortunately, due to the small number of monitoring wells and lack of available subsurface aquifer mapping, it is impossible to draw any global conclusions concerning the ambient groundwater characteristics in the Niagara Peninsula. This same conclusion was also made in the Ambient Groundwater Quality Study completed in 2008 by Jagger Hims Limited.

Staff would also advise that the future of this program is currently uncertain. In this regard, during the 2010 budget deliberations, the Region of Niagara initially advised that elimination of funding for this program was forthcoming. Nonetheless, after a series of meetings, the NPCA modified some sampling locations in an effort to make the testing program more relevant to the Region. Nonetheless, the Region has advised that the value of this program will be reassessed again for the 2011 budget. In addition, we are currently attempting to have the Region reconsider its subsequent withdrawal from an "in kind" testing arrangement in place since 2003. Otherwise, NPCA will not be able to complete even the minimal program undertaken in 2009. This is a concern of staff as we see this program as being a core operations program of the CA.

Although the results of the 2009 testing are interesting and suggest certain cause-effect relationships, for this program to ultimately produce actionable conclusions, it must expand in scope and more financial resources are required before this can be achieved.

Attachments:

1. 2009 Water Quality Monitoring Program Annual Report, dated May 2010.

RECOMMENDATION:

That the 2009 Water Quality Monitoring Program Annual Report appended be received.

That the 2009 Water Quality Monitoring Program Annual Report be forwarded to the watershed Municipalities, Medical Officers of Health and Ministry of Environment.

Prepared by: John Kukalis; Director, Water Management

Respectfully Submitted By: _____

Tony D'Amario, P. Eng.
Chief Administrative Officer/Secretary-Treasurer

NPCA WATER QUALITY MONITORING PROGRAM:

2009 ANNUAL REPORT

APRIL 2010

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Niagara Peninsula Conservation Authority (NPCA) Water Quality Monitoring Program was implemented in 2001 and is operated in partnership with the Ontario Ministry of the Environment, Regional Municipality of Niagara, and the City of Hamilton. Through these partnerships the NPCA collects water quality samples at 68 surface water stations and 13 groundwater stations located throughout the NPCA watershed. The NPCA utilizes both chemical and biological approaches to evaluate the surface water quality. Surface water quality samples are analysed for several indicators such as nutrients, *E. coli*, suspended solids, and metals. Surface water results are used to calculate the Canada Council of Ministries of Environment (CCME) Water Quality Index. This index is a Canada-wide standard for reporting water quality information. The NPCA also evaluates water quality in the watershed by sampling the aquatic animals at most of the NPCA surface water quality stations using the BioMAP protocol. The density and diversity of animals living in the watercourse provides a biological snapshot of the water quality. Groundwater samples are evaluated by comparing monitoring results to the Ontario Ministry of the Environment's Drinking Water Standards.

For surface water, the biological and chemical monitoring results indicate that most of Niagara's watersheds have poor or impaired water quality. Total phosphorus, *E.coli*, suspended solids, and chlorides from non-point sources such as agricultural runoff, faulty septic systems, poor manure storage facilities and urban stormwater continue to be the major causes of impairment in the NPCA watershed. Twelve Mile Creek continues to have the best water quality rating in the NPCA watershed owing to its high forest cover and limited agricultural and rural development.

For groundwater, results indicate that water quality generally meets Ontario Drinking Water Standards. Reported groundwater quality exceedances were generally related to naturally occurring bedrock conditions; however, two groundwater monitoring stations were found to have elevated nitrate concentrations. These nitrate exceedances are likely attributed to surrounding agricultural landuse and/or faulty septic systems.

The Water Quality Monitoring Program continues to provide valuable information about the health of the NPCA watershed. Often the way the land is managed is reflected in the health of our water resources. The water quality is generally poor in the NPCA watershed and this has been caused by decades of environmental degradation. However, water quality improvement programs that target nutrient management, increase riparian buffers, and improve forest cover will address the significant water quality concerns in the NPCA watershed. The progress of these water quality improvement programs can be offset by the unknown amounts of environmental degradation in NPCA watershed. Therefore, this degradation needs to be quantified in order to properly assess the progress of watershed restoration. Consequently, it will likely take several years to restore the NPCA watershed to meet federal and provincial water quality guidelines and objectives. The NPCA will continue to monitor both surface water and groundwater resources to ensure there is current, scientifically defensible water quality information available for the NPCA watershed.

NPCA WATER QUALITY MONITORING PROGRAM: 2009 ANNUAL REPORT

1.0 INTRODUCTION

The NPCA Water Quality Monitoring Program was initiated in the summer of 2001. Previous to 2001, the NPCA was involved in numerous water quality related initiatives but did not have a dedicated monitoring program. The NPCA has since established an extensive network of monitoring stations located throughout the watershed with the purpose of gathering long-term water quality data for both surface and groundwater. This network represents the largest and most comprehensive water quality monitoring program in the Niagara Peninsula. The NPCA monitoring network is operated in partnership with the Ontario Ministry of the Environment (MOE), Regional Municipality of Niagara, and City of Hamilton. The main objective of the NPCA Water Quality Monitoring Program is to assess water quality in local watersheds using a network of chemical and biological monitoring stations. The purpose of the 2009 Annual Report is to summarize the water quality data collected from these monitoring stations and provide recommendations for future monitoring and restoration initiatives.

2.0 SURFACE WATER QUALITY MONITORING PROGRAM

2.1 CHEMICAL MONITORING

The NPCA currently monitors surface water quality at 68 stations covering 40 watersheds. Grab samples are collected monthly during the ice-free season and analyzed for several parameters including nutrients, metals, bacteria, suspended solids, and general chemistry.

2.1.1 NIAGARA RIVER AOC TRIBUTARY MONITORING PROGRAM

The Niagara River Remedial Action Plan Stage 2 Report released in 1995 by Environment Canada and the MOE outlines 37 recommended remedial actions to restore the health of the watershed. Recommendation #29 is to develop and implement a Welland River and Niagara River tributaries monitoring program to monitor rural non-point sources of pollution and track the effectiveness of restoration efforts (MOE and Environment Canada 1995). In order to fulfill this recommendation, the Niagara River Area of Concern (AOC) Tributary Monitoring Program was implemented in 2003 through a partnership between the NPCA and the MOE. The objectives of the program are to establish baseline water quality conditions at selected tributaries and track changes in water quality over time. Monitoring stations for the Niagara River AOC Tributary Monitoring Program were selected as specified in the funding agreement and sampling was initiated in 2003. Stations were selected to both overlap with historic stations and fill data gaps where required. Annual monitoring reports for this program were completed in both 2004 and 2005 (NPCA 2004, 2005).

2.1.2 PROVINCIAL WATER QUALITY MONITORING NETWORK

In 2003 a partnership was established with the MOE through the Provincial Water Quality Monitoring Network (PWQMN) whereby NPCA staff collect monthly water samples at six stations located within the NPCA watershed and the MOE provides laboratory services. The PWQMN was established in 1964 to collect surface water quality information from rivers and streams at strategic locations throughout Ontario. Over time, stations have been added and discontinued in response to changing MOE and program-specific needs. The six NPCA PWQMN stations established in 2003 are located on the Welland River,

Twenty Mile Creek, Four Mile Creek, and upper Twelve Mile Creek.

2.1.3 Other Water Quality Monitoring Programs

Several watersheds are monitored through other water quality monitoring programs. In 2002 a monitoring agreement was established with the City of Hamilton whereby NPCA staff collect monthly water samples at eleven stations located within the City of Hamilton's municipal boundaries and the City of Hamilton provides laboratory services. Monitoring stations were selected based on existing water quality information and local landuse issues. The headwaters of the Welland River and Twenty Mile Creek are located in the former Township of Glanbrook in the City of Hamilton. The Welland River and Twenty Mile Creek are the largest watersheds in the NPCA jurisdiction, covering a combined drainage area of 1,325 km^2. In 2003 a similar monitoring agreement was established with the Regional Municipality of Niagara whereby NPCA staff collect water samples at ten stations located within the NPCA watershed and the Region provides laboratory services.

In 2004 the NPCA began monitoring tributaries of Twenty Mile Creek as part of the Twenty Mile Creek Watershed Plan (NPCA 2006a). In 2006 the NPCA began monitoring additional stations in upper Twelve Mile Creek, Fifteen, Sixteen and Eighteen Mile Creeks, and South Niagara Falls creeks (Grassy Brook, Tee Creek, Bayer Creek) as part of their respective watershed plans. In 2007 the NPCA began monitoring creeks and municipal drains located along Lake Erie as part of the Lake Erie North Shore Watershed Plan. In 2008 the NPCA began monitoring Shriners Creek and Beaverdams Creek as part of the watershed plan that is currently under development for these watersheds.

2.2 Biological Monitoring

The NPCA also monitors surface water quality using benthic invertebrates as indicators of stream health. Water quality monitoring has historically relied heavily upon chemical testing as a means of measuring the quality of water but the advantages of biological monitoring using benthic invertebrates as indicators of water quality are well documented (Griffiths 1999, Jones *et al.* 2005). Due to their restricted mobility and habitat preferences benthic invertebrates usually remain in a localized area. As a result they are continuously subjected to the effects of all pollutants and environmental stream conditions over time, and as such can provide a broad overview of water quality related problems. They are abundant in all types of aquatic systems and can be easily collected and identified.

2.2.1 Biological Monitoring and Assessment Program

The NPCA has been using benthic invertebrates as indicators of water quality since 1995 and is a leader in the field of biological monitoring in the Niagara Peninsula. Benthic invertebrate samples are collected annually during the spring and fall seasons using the Biological Monitoring and Assessment Program (BioMAP) developed by Dr. Ron Griffiths (Griffiths 1999). BioMAP water quality assessments have been completed at over 100 sites located throughout the NPCA watershed. BioMAP monitoring projects are also completed annually and biennially by the NPCA for Hamilton International Airport and the City of Hamilton Glanbrook Landfill to evaluate environmental management practices.

2.2.2 ONTARIO BENTHOS BIOMONITORING NETWORK

The NPCA is also involved in the development of the Ontario Benthos Biomonitoring Network (OBBN). The OBBN is a biomonitoring research initiative that was launched in 2002 and is jointly led by the MOE and Environment Canada. The goal of the OBBN is to provide a standardized benthic invertebrate sampling protocol for the province of Ontario. A secondary goal of the OBBN is to provide a biological complement to the chemistry-based PWQMN. The NPCA is an active participant in the development of the OBBN, and is providing on-going research support in the upper Twelve Mile Creek watershed. It is anticipated that the NPCA will use the OBBN protocol to collect benthic invertebrate samples once the network has been firmly established and the protocol can be applied to warm water clay-based watercourses such as the Welland River. In the interim, MOE has indicated that the BioMAP protocol is an acceptable method of collecting and analyzing benthic invertebrate data until the OBBN protocol has been finalized (Jones, personal communication 2006).

3.0 SURFACE WATER QUALITY INDICATOR PARAMETERS

The indicator parameters described in the following sections best reflect the range of water quality issues that are likely encountered in the watershed and are most useful in assessing relative stream quality. These indicator parameters and their respective surface water quality objectives are summarized in **Table 1**.

Table 1: Summary of surface water quality indicator parameters

CATEGORY	INDICATOR PARAMETER	OBJECTIVE	REFERENCE
Nutrients	Total phosphorus	0.03 mg/L	PWQO (MOE 1994)
Nutrients	Nitrate	13 mg/L	CWQG (CCME 2007)
Metals	Copper	0.005 mg/L	PWQO (MOE 1994)
Metals	Lead	0.005 mg/L	PWQO (MOE 1994)
Metals	Zinc	0.02 mg/L	PWQO (MOE 1994)
Microbiological	*Escherichia coli*	100 counts/100 mL	PWQO (MOE 1994)
Other	Chloride	100 mg/L	CWQG (CCME 2005)
Other	Suspended solids	25 mg/L	BC MOE (2001)
Biological	Benthic invertebrates	Unimpaired	BioMAP (Griffiths 1999)

3.1 CHLORIDE

Chloride is a naturally occurring substance found in all waters. Chloride can be toxic to aquatic organisms with acute toxic effects at high concentrations and chronic effects on growth and reproduction at lower concentrations. Chloride ions are conservative, which means that they are not degraded in the aquatic environment and tend to remain in solution. Chloride is extensively used in the form of sodium chloride and calcium chloride for salting of roadways and ice removal during the winter season. Other anthropogenic or human-derived sources of chloride include sewage, animal waste, storm and irrigation drainage, fertilizers, and industrial effluent. Due to natural variability there is currently no guideline for chloride in surface water. The Canadian Water Quality Guidelines (CWQG) for the Protection of Agricultural Water Uses indicate that the lower limit for chloride concentrations in irrigation water is 100 mg/L for certain crop types, including some tender fruit crops (CCME 2005).

3.2 NITRATE

Nitrate is the most common form of nitrogen that occurs in surface water. In aerobic or oxygen-rich water, bacteria convert ammonium and nitrite to nitrate through a process known as nitrification. In anaerobic or oxygen-depleted water, the process is reversed through denitrification. The nitrate ion is the most stable form of nitrogen in water and does not tend to combine with other ions in solution. Nitrate can be toxic to aquatic organisms and elevated concentrations contribute to excessive plant and algae growth in surface water. Anthropogenic sources of nitrate include sewage discharges, animal waste, fertilizers and pesticides. The province of Ontario is currently developing a surface water quality objective for nitrate. The interim Canadian Water Quality Guidelines for the Protection of Aquatic Life recommend that nitrate concentrations should not exceed 13 mg/L in surface water (CCME 2007).

3.3 TOTAL PHOSPHORUS

Phosphorus is a natural element found in rocks, soils and organic material and is an essential nutrient for plant growth. Phosphorus clings tightly to soil particles and is often associated with suspended sediment. Excessive phosphorus concentrations stimulate the overgrowth and decomposition of plants and algae. The decomposition of organic matter in turn depletes dissolved oxygen concentrations and stresses aquatic organisms such as fish and benthic invertebrates. Total phosphorus is a measure of all forms of phosphorus in a water sample, and includes biologically accessible phosphates. Anthropogenic sources of phosphorus include fertilizers, pesticides, and sewage discharges. The interim Ontario Provincial Water Quality Objective (PWQO) for total phosphorus in streams and rivers is 0.03 mg/L (MOE 1994).

3.4 SUSPENDED SOLIDS

Suspended solids are a measure of undissolved solid material in surface water and usually consist of silt, clay, plankton, and fine particles of organic and inorganic matter. Sources of suspended solids include soil erosion, stormwater, wastewater, and industrial effluent. Fine particles are significant carriers of phosphorus, metals and other contaminants. Concentrations of suspended solids vary seasonally and often peak during rain events. Due to natural variability in surface water there is currently no water quality guideline for suspended solids in Ontario. High concentrations of suspended solids in surface water can negatively impact aquatic organisms. Water quality guidelines for the protection of aquatic life from the British Columbia Ministry of the Environment recommend that the maximum concentration of suspended solids in surface water should not exceed 25 mg/L when background concentrations are between 25 and 250 mg/L (BC MOE 2001).

3.5 COPPER

Copper is an essential trace element that is toxic to aquatic organisms at elevated concentrations. In surface water copper tends to bind with organic matter and accumulate in streambed sediment. Anthropogenic sources of copper include industrial wastewater, sewage discharges and pesticides. The interim PWQO for copper is 0.005 mg/L (MOE 1994).

3.6 LEAD

Lead is a non-essential trace element that is toxic to aquatic organisms at elevated concentrations. Lead tends to bioaccumulate and can affect the central nervous system. Anthropogenic sources of lead include industrial wastewater, sewage discharges, municipal waste incineration, fertilizers and pesticides. The interim PWQO for lead is 0.005 mg/L (MOE 1994).

3.7 ZINC

Zinc is an essential trace element that is toxic to aquatic organisms at elevated concentrations. In surface water zinc tends to bind with organic matter and accumulate in streambed sediment. Anthropogenic sources of zinc include industrial wastewater, sewage discharges and stormwater runoff. The interim PWQO for zinc is 0.02 mg/L (MOE 1994).

3.8 *ESCHERICHIA COLI*

Escherichia coli (*E. coli*) is a type of fecal coliform bacteria that is commonly found in the intestines of warm-blooded animals and humans. *E. coli* is used as an indicator for the presence of sewage or animal waste in surface water, and the possible presence of pathogens (Tchobanoglous & Schroeder 1987). The PWQO for *E. coli* is 100 counts per 100 mL (MOE 1994).

3.9 BENTHIC INVERTEBRATES

Benthic invertebrates are the larger organisms inhabiting the substrate of watercourses for at least part of their life cycle. As a general rule, benthic invertebrates include those species whose body width exceeds 500 microns. Examples of benthic invertebrate species that are commonly found in the NPCA watershed include clams, snails, leeches, worms, and the larval stages of dragonflies, stoneflies, caddisflies, mayflies, and beetles.

Benthic invertebrate samples are collected during the spring and fall seasons using the BioMAP protocol developed by Dr. Ron Griffiths (1999). Once collected, counted and preserved, the benthic invertebrates are identified to genus level. Each genus is assigned a sensitivity value which is used to determine if sample water quality is *impaired* or *unimpaired*. *Unimpaired* water quality is recognized by the occurrence of organisms whose environmental requirements and tolerances match those which would be expected at the site without the input of environmental stresses. At sites where water quality is *impaired*, the organisms found are less sensitive and therefore more tolerant to environmental stresses than organisms which would have historically occurred. The benthic population at an impaired site would typically be dominated by these more tolerant species, and as a result biodiversity at the site would be quite low. The g*rey zone* category indicates that results are inconclusive and that further assessment is required to determine whether water quality is *impaired* or *unimpaired*.

4.0 SURFACE WATER QUALITY MONITORING RESULTS

The Water Quality Index (WQI) was used to summarize the indicator parameter data collected from NPCA surface water quality monitoring stations between 2002 and 2009. The WQI was developed by a sub-committee established under the Canadian Council for Ministers of the Environment (CCME) Water Quality

Guidelines Task Group to provide a convenient means of summarizing complex water quality information and communicating it to the public (CCME 2001). The WQI incorporates the number of parameters where water quality objectives have been exceeded, the frequency of exceedances within each parameter, and the amplitude of each exceedance. The index produces a number between 0 and 100 which represents the worst and best water quality, respectively. These numbers are divided into five descriptive categories that range from *poor* to *excellent* (**Table 2**). The CCME WQI has been used extensively by other agencies, including conservation authorities and provincial ministries, as a means of reporting water quality data.

Table 2: CCME Water Quality Index categories (CCME 2001)

CATEGORY	WATER QUALITY	DESCRIPTION
Excellent	95-100	Water quality is protected with a virtual absence of threat or impairment; conditions very close to natural or pristine levels.
Good	80-94	Water quality is protected with only a minor degree of threat or impairment; conditions rarely depart from natural or desirable
Fair	65-79	Water quality is usually protected but occasionally threatened or impaired; conditions sometimes depart from natural or
Marginal	45-64	Water quality is frequently threatened or impaired; conditions often depart from natural or desirable levels.
Poor	0-44	Water quality is almost always threatened or impaired; conditions usually depart from natural or desirable levels.

The calculation of the WQI is dependent on the water quality parameters and objectives selected for analysis. The indicator parameters and objectives summarized in **Table 1** were used to determine the WQI for NPCA monitoring stations. Benthic invertebrate data is not included in the WQI and is presented separately. It is important to note that the water quality information presented in this report is limited by the size of the dataset which represents 1 to 8 years of data, depending on the station. The reliability of the data will increase over time as more data is collected and a wider range of water quality conditions is captured in the dataset.

4.1 WELLAND RIVER WATERSHED

The Welland River is the largest watershed in the NPCA jurisdiction with a total drainage area of 1,023 km^2. The watershed covers eleven local municipalities, originating in the Town of Ancaster and spanning the center of the Niagara Peninsula to its physical outlet in the City of Niagara Falls at the Niagara River (**Figure 1**). Over 70% of the watershed is classified as rural. The Welland River is part of the Niagara River Area of Concern (AOC) and is targeted for restoration through the Remedial Action Plan. As shown in **Appendix A**, 23 of the 68 surface water quality monitoring stations are located in the Welland River watershed, and ten of these 23 stations are located on the Welland River.

4.1.1 Welland River: Water Quality Index

As shown in **Table 3**, the calculated Water Quality Index (WQI) for the Welland River ranges from *poor* to *marginal*. Based on the data collected to date, nine of ten Welland River stations have *poor* water quality and one station (WR010) was rated as *marginal*. WQI results are illustrated in **Appendix A**. Index results and water quality monitoring data collected from the Welland River between 2002 and 2009 are summarized as follows:

- Water quality at headwater stations WR00A and WR000 are rated as *poor*. Both headwater stations are impacted by elevated concentrations of *E. coli* and total

phosphorus, which resulted in lower index values. Phosphorus concentrations are particularly elevated at station WR00A when compared to other Welland River stations (**Figure 2**). Sources of phosphorus and bacteria include runoff from agricultural landuse, animal waste, soil erosion, and sewage discharges. Baseflow at both stations is influenced by groundwater discharge; however, summer observations indicate that baseflow at station WR00A is sustained entirely by groundwater discharge. Upstream alterations to hydrology and landuse may be impacting water quality at this site and continued monitoring is recommended.

- Water quality at headwater stations WR001 and WR002 is *poor* due to elevated concentrations of chloride, phosphorus, *E. coli*, copper and zinc. Zinc concentrations at these stations were found to exceed the provincial objective in almost all samples collected and it may be caused by zinc leaching from galvanized roofing material from the airport complex. The Ontario Ministry of Environment has been notified by these exceedances and there will be an investigation of the zinc source. Chloride concentrations in excess of 1000 mg/L were observed at station WR002. Stormwater and glycol discharges from Hamilton International Airport are sources of impairment at these stations. In June of 2007 NPCA water quality staff observed a spill at station WR002 and reported this incident to the MOE Spills Action Centre. Subsequent cooperation between the NPCA, MOE and Hamilton International Airport resulted in further investigation by the MOE and the drafting of a Certificate of Approval to regulate and monitor stormwater discharges to the Welland River and Twenty Mile Creek originating from airport property. In 2010 the airport will be relocating its salt storage facility in order to eliminate potential salt storage impacts to station WR002; it is anticipated that this move will reduce the amount of chloride reaching this station. The NPCA will continue to monitor water quality at these stations in 2010.

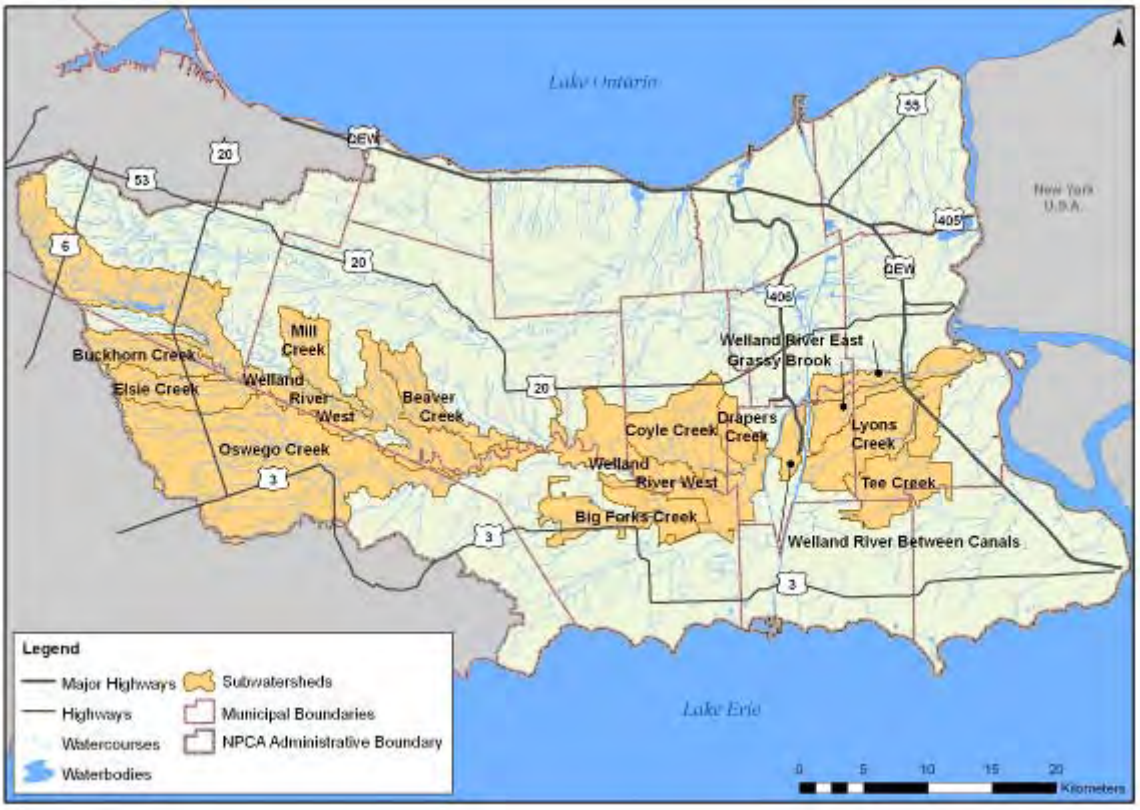

Figure 1: Map of the subwatersheds monitored for water quality within the Welland River watershed

- Based on current data, elevated concentrations of total phosphorus are a widespread cause of water quality impairment in the Welland River. 100% exceedance is observed at stations WR003 through to WR007, with total phosphorus concentrations up to 20 times greater than the provincial objective. As shown in **Figure 2**, mean total phosphorus concentrations at all stations greatly exceed the provincial objective. Manure from livestock operations, sewage discharges, soil erosion, fertilizers, and pesticides are sources of total phosphorus in the Welland River.

Table 3: Summary of NPCA water quality data for the Welland River (2001-2009)

STATION	WQI RATING	BIOMAP RATING	FACTORS AFFECTING WATER QUALITY
WR00A	Poor	Impaired	• Exceedances of *E. coli* and total phosphorus • Site has continuous baseflow due to sustained groundwater discharge but hydrology has been altered upstream • Inadequate upstream forest and riparian buffer
WR000	Poor	Impaired	• Exceedances of *E. coli* and total phosphorus • Site is vulnerable to intermittent baseflow due to seasonal fluctuations in groundwater discharge • Adequate upstream forest and riparian buffer • This section of the watercourse supports some sensitive taxa such as stoneflies and mayflies
WR001	Poor	Impaired	• Exceedances of chloride, *E. coli*, total phosphorus and zinc • Watercourse is contaminated by runoff from airport property • Sedimentation caused by erosion and stormwater runoff
WR002	Poor	Impaired	• Exceedances of chloride, *E. coli*, total phosphorus and zinc • Watercourse is contaminated by runoff from airport property • Sedimentation caused by erosion and stormwater runoff
WR003	Poor	Impaired	• Exceedances of chloride, copper, total phosphorus, suspended solids and zinc • Inadequate upstream forest and riparian buffer • Sedimentation caused by upstream agricultural runoff • Evidence of nutrient enrichment
WR004	Poor	Grey Zone	• Exceedances of copper, *E. coli*, total phosphorus, suspended solids and zinc • Adequate upstream forest and riparian buffer • Site supports some sensitive taxa such as stoneflies and mayflies • Sedimentation caused by upstream agricultural runoff • Evidence of nutrient enrichment
WR005	Poor	Impaired	• Exceedances of nitrate, total phosphorus and suspended solids • Sedimentation caused by upstream agricultural runoff • Evidence of nutrient enrichment
WR006	Poor	Impaired	• Exceedances of nitrate, total phosphorus and suspended solids • Sedimentation caused by upstream agricultural runoff • Evidence of nutrient enrichment
WR007	Poo	Impaired	• Exceedances of nitrate and total phosphorus • Algae observed during summer months • Site is invaded by non-native Zebra Mussels
WR010	Ma	n/a	• Exceedances of total phosphorus and *E. coli*

- Water quality in the mid to lower reaches of the Welland River (i.e. stations WR003 to WR007) is rated as *poor*. These stations are most impacted by nutrient enrichment and elevated concentrations of suspended solids. Sources of nutrients and suspended solids include runoff from agricultural landuse, soil erosion, sewage discharges, and animal waste.

- The best water quality rating for the Welland River is observed at station WR010 where water quality is rated as *marginal*. Water quality at this location is improved by direct mixing with inflow from the Niagara River as it is redirected up the Welland River as part of the hydroelectric operations.

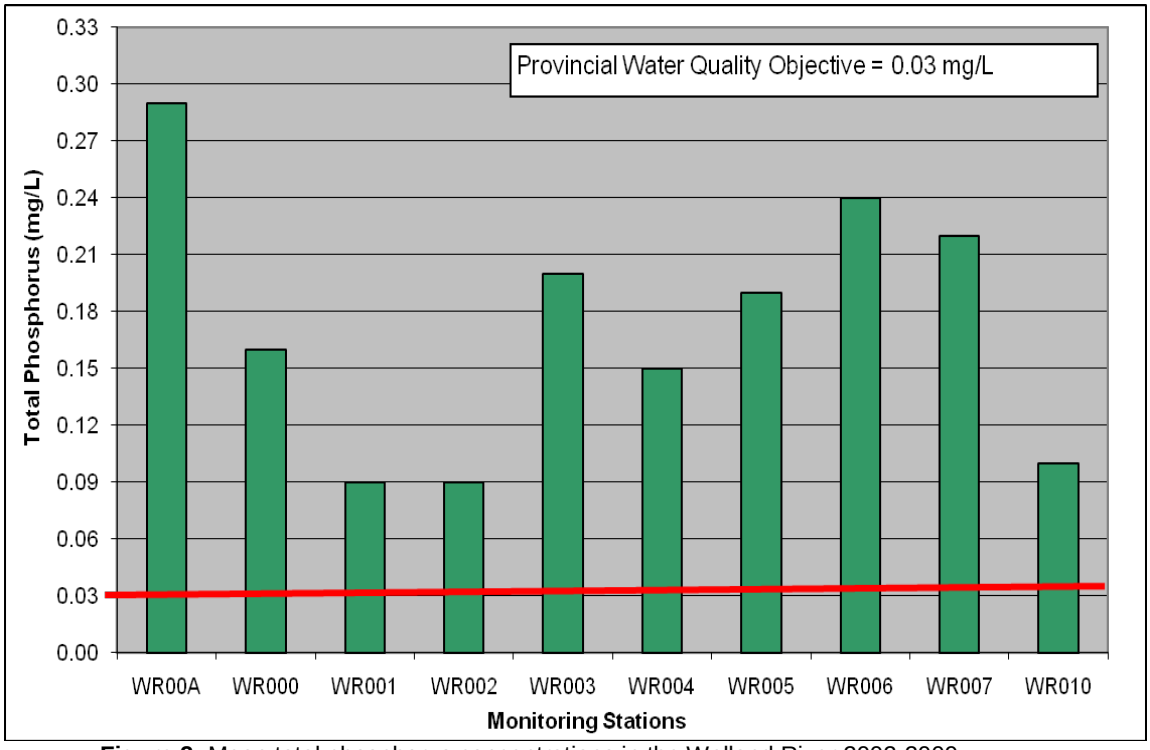

Figure 2: Mean total phosphorus concentrations in the Welland River 2002-2009

4.1.2 WELLAND RIVER: BIOMAP RESULTS

BioMAP results indicate that water quality is *impaired* at most stations in the Welland River (**Table 3**). Results from BioMAP assessments completed between 2001 and 2009 are illustrated in **Appendix B**. Benthic invertebrates at stations WR001 and WR002 are negatively impacted by stormwater and glycol discharges from Hamilton International Airport (HIA). The NPCA has completed annual BioMAP assessments for Hamilton International Airport since 1998 (NPCA 2009a). Recent NPCA reports recommend that HIA review its stormwater and glycol management practices in order to improve water quality in the upper Welland River. The NPCA also completes biennial BioMAP assessments of the Glanbrook Landfill for the City of Hamilton. BioMAP assessments completed between 1998 and 2008 indicate that water quality is impaired; however, there is no additional impairment resulting from the landfill (NPCA 2009b).

Station WR004 falls into the *grey zone* BioMAP category meaning the animal community at this site does not indicate a clear impairment nor does it fully match unimpaired conditions. The *grey zone* designation indicates that future BioMAP sampling will be planned in the future for this site to collect additional benthos information to determine the site's impairment status. The continuous flow from the Binbrook Reservoir and improved habitat are likely causes for the higher BioMAP rating at this station. Sediment loading, lack of in-stream habitat, and nutrient enrichment are the primary causes of impairment at all stations. A BioMAP assessment was not completed for WR010 due to high water depth and channel morphology. This station is located at the siphon where

the Welland River flows beneath the Welland Canal and will require boat access for sample collection.

4.2 WELLAND RIVER TRIBUTARIES

Eleven tributaries of the Welland River are monitored through the NPCA Water Quality Monitoring Program. These tributaries include: Buckhorn Creek, Elsie Creek, Mill Creek, Oswego Creek, Beaver Creek, Big Forks Creek, Coyle Creek, Drapers Creek, Grassy Brook, Tee Creek, and Lyons Creek (**Figure 1**). Tributaries were selected based on drainage area, landuse, restoration projects, and watershed plans.

4.2.1 WELLAND RIVER TRIBUTARIES: WATER QUALITY INDEX

Based on the results of the Water Quality Index (WQI) ten of thirteen Welland River tributary stations have water quality that is rated as *poor* (**Table 4**). Stations CO001, LY003, and GR001 were found to have water quality rated as *marginal*. WQI results are illustrated in **Appendix A.** Index results and water quality monitoring data collected from these tributaries between 2002 and 2009 are summarized as follows:

- *E. coli* concentrations frequently exceed the provincial objective in Buckhorn Creek, Big Forks Creek, Beaver Creek, Coyle Creek, Drapers Creek, Elsie Creek, Mill Creek, and Oswego Creek. Sources of *E. coli* in these tributaries include runoff from urban and agricultural landuse, sewage discharges, and the presence of waterfowl.
- Chloride concentrations frequently exceed the guideline for irrigation water in Elsie Creek, Buckhorn Creek, and Oswego Creek. Sources of chloride in these tributaries include stormwater runoff, de-icing salt applied to roads, and sewage discharges.
- Elevated concentrations of suspended solids are impacting water quality in Oswego Creek. Sources of suspended solids in this tributary include runoff from agricultural landuse and soil erosion.
- The *marginal* water quality rating for Lyons Creek station LY003 may be attributed in part to the influence of Lake Erie water pumped in from the Welland Canal at the headwaters of Lyons Creek.
- *Marginal* water quality ratings were again obtained at stations CO001 and GR001 in 2009. Station GR001 was added to the network in 2006 as part of the South Niagara Falls Watershed Plan and currently has very limited data. As a result this index rating may change as additional data is collected. Water quality at Coyle Creek station CO001 is improved by increased forest cover.
- Similar to the Welland River, water quality in all tributaries monitored is impacted by elevated concentrations of total phosphorus. High concentrations of phosphorus are a widespread cause of water quality impairment in these tributaries. 100% exceedance is observed at most stations with total phosphorus concentrations up to three orders of magnitude higher than the provincial objective. As shown in **Figure 3**, mean total phosphorus concentrations at all stations greatly exceed the provincial objective, particularly at stations BV001, BF001 and OS001. Of the 68 NPCA surface water quality monitoring stations, Beaver Creek station BV001 again has the highest mean concentration of total phosphorus in 2009. Manure

from livestock operations, sewage discharges, soil erosion, fertilizers, and pesticides are likely sources of total phosphorus in these tributaries.

Table 4: Summary of NPCA water quality data for Welland River tributaries (2001-2009)

STATION	WATERSHED	WQI RATING	BIOMAP RATING	FACTORS AFFECTING WATER QUALITY
BF001	Big Forks	Poor	Impaired	• Exceedances of nitrate, *E. coli* , total phosphorus and suspended solids • Algae observed during summer months
BU000	Buckhorn Creek	Poor	Impaired	• Exceedances of *E. coli*, chloride and total phosphorus • High sediment loading evident from upstream erosion and runoff • Evidence of nutrient enrichment • Low baseflow conditions in summer • Adequate upstream forest and riparian buffer
BU001	Buckhorn Creek	Poor	Impaired	• Exceedances of *E. coli*, chloride, and total phosphorus • High sediment loading evident from upstream erosion and runoff • Evidence of nutrient enrichment • Low baseflow conditions in summer • Adequate upstream forest and riparian buffer
BV001	Beaver Creek	Poor	Impaired	• Exceedances of *E. coli* and total phosphorus • Algae observed during summer months
CO001	Coyle Creek	Marginal	Impaired	• Exceedances of *E. coli*, total phosphorus and suspended solids • High sediment loading evident from upstream erosion and runoff • Evidence of nutrient enrichment • Site invaded by non-native Zebra Mussels • Adequate upstream forest and riparian buffer
DR001	Drapers Creek	Poor	Impaired	• Exceedances of *E. coli* and total phosphorus • High sediment loading evident from upstream runoff • Site vulnerable to contaminants in runoff from urbanized sections of the watercourse and urban encroachment • Algae observed during summer months
EL001	Elsie Creek	Poor	Impaired	• Exceedances of chloride, *E. coli* and total phosphorus • High sediment loading evident from upstream erosion and runoff • Nutrient enrichment from upstream agricultural areas • Algae observed during summer months
GR001	Grassy Brook	Mar	Impaired	• Exceedances of total phosphorus • Algae observed during summer months
TE001	Tee Creek	Poor	Impaired	• Exceedances of total phosphorus and *E. coli*
LY003	Lyons Creek	Mar	Impaired	• Exceedances of total phosphorus • Site is invaded by non-native Zebra mussels
MI001	Mill Creek	Poor	Impaired	• Exceedances of total phosphorus and *E. coli*
OS001	Oswego Creek	Poor	Impaired	• Exceedances of *E. coli*, total phosphorus and suspended solids
OS002	Oswego Creek	Poor	Impaired	• Exceedances of chloride, *E. coli*, total phosphorus and suspended solids • Sediment loading evident from upstream erosion or runoff • Nutrient enrichment from upstream agricultural areas

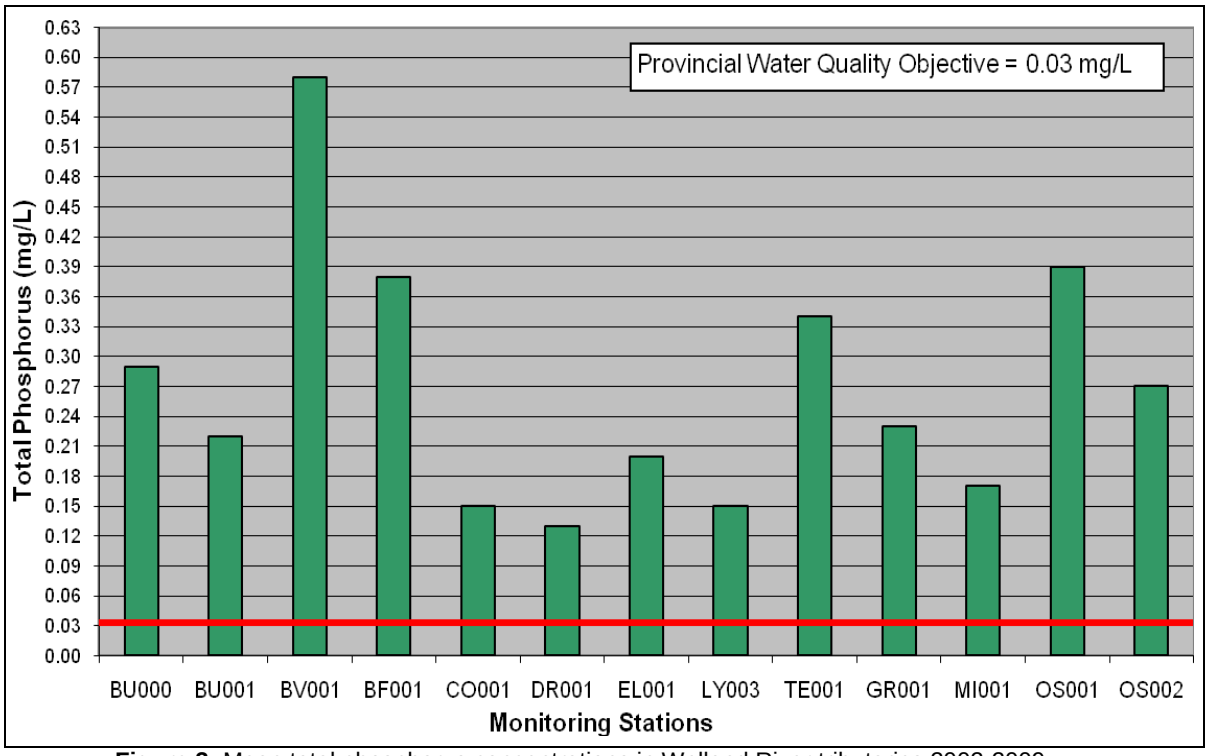

Figure 3: Mean total phosphorus concentrations in Welland River tributaries 2002-2009

4.2.2 Welland River Tributaries: BioMAP Results

BioMAP results indicate that water quality is *impaired* at all Welland River tributary stations currently monitored (**Table 4**). Results from BioMAP assessments completed between 2001 and 2009 are illustrated in **Appendix B**. Sediment loading, lack of in-stream habitat, and nutrient enrichment are the primary causes of impairment at all stations. Buckhorn Creek BioMAP assessments are completed biennially by the NPCA for the City of Hamilton as part of the Glanbrook Landfill monitoring plan. BioMAP assessments completed between 1998 and 2008 indicate that water quality is impaired; however, there is no additional impairment resulting from the landfill (NPCA 2009b). BioMAP assessments were completed at Beaver Creek station BV001 and Mill Creek station MI001 for the first time in 2009. Water quality at these stations was found to be impaired. Sediment loading, lack of in-stream habitat, and nutrient enrichment are the primary causes of impairment at all stations.

4.3 Twenty Mile Creek Watershed

The Twenty Mile Creek watershed is the second largest watershed in the NPCA jurisdiction with a total drainage area of 302 km^2. Eight of 68 NPCA surface water quality monitoring stations are located within the Twenty Mile Creek watershed. There are five stations on the main channel and three stations for each of the subwatersheds which include Spring Creek, North Creek and Gavora Ditch (**Figure 4**). There is no surface water monitoring station for Sinkhole Creek since flow in this subwatershed is highly intermittent due to low baseflow and karst topography.

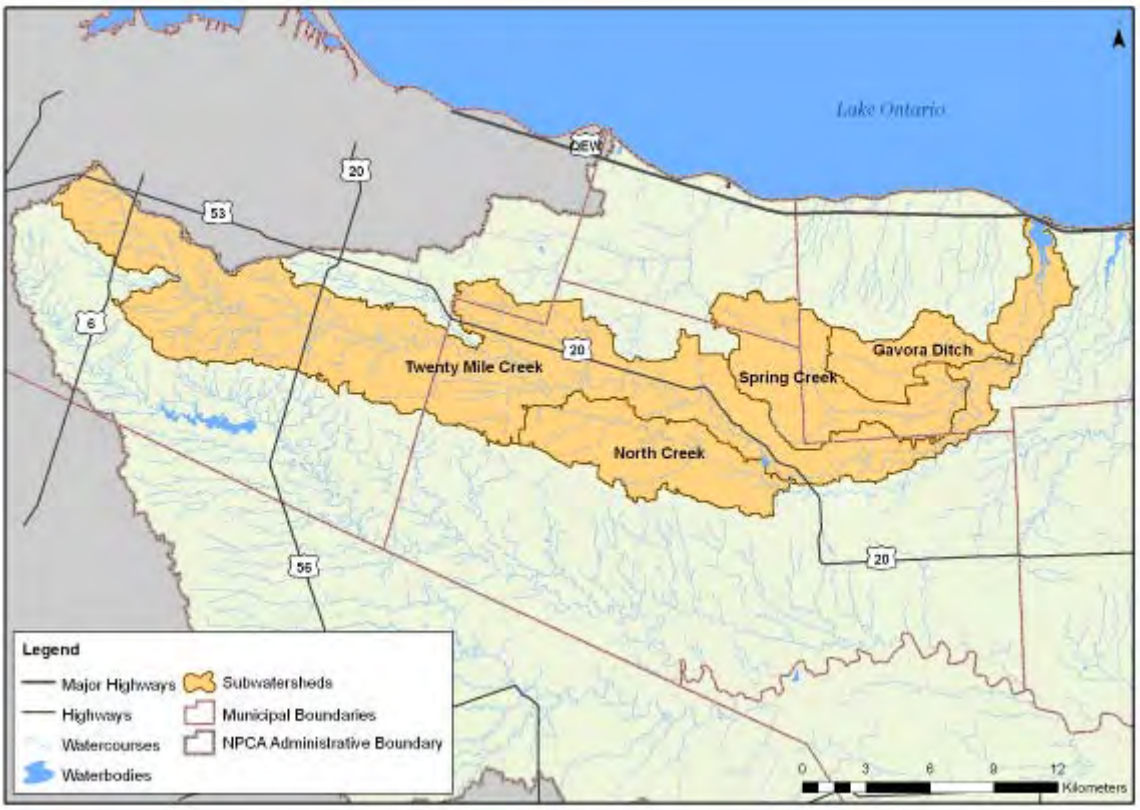

Figure 4: Map of the subwatersheds monitored for water quality within the Twenty Mile Creek watershed

4.3.1 Twenty Mile Creek Watershed: Water Quality Index

Based on the results of the Water Quality Index (WQI) seven of eight Twenty Mile Creek watershed stations have water quality that is rated as *poor* (**Table 5**). Water quality at Gavora Ditch station GV001 is rated as *marginal*. WQI results are illustrated in **Appendix A**. Index results and water quality monitoring data collected from the Twenty Mile Creek watershed between 2002 and 2009 is summarized as follows:

- Water quality at all monitoring stations is impacted by elevated concentrations of total phosphorus. Total phosphorus is a widespread cause of water quality impairment in the Twenty Mile Creek watershed, and frequent exceedances of the provincial objective occur at all stations. As shown in **Figure 5**, mean total phosphorus concentrations for the Twenty Mile Creek watershed greatly exceed the provincial objective at all stations, particularly stations TN004, GV001 and NC001. Manure from livestock operations, sewage discharges, soil erosion, fertilizers, and pesticides are likely sources of total phosphorus in this watershed.
- *E. coli* concentrations frequently exceed the provincial objective throughout the Twenty Mile Creek watershed. Sources of *E. coli* include runoff from urban and agricultural landuse, animal waste, sewage discharges, and the presence of waterfowl.
- Chloride concentrations frequently exceed the guideline for irrigation water at stations TN001, TN003, TN004 and TN006. Sources of chloride at these stations include runoff from urban and agricultural landuse, de-icing salt from roads, and sewage discharges.

- Copper and zinc concentrations exceed the provincial objective in the mid to upper reaches of Twenty Mile Creek. Sources of copper and zinc in upper reaches include runoff from urban and agricultural landuse.

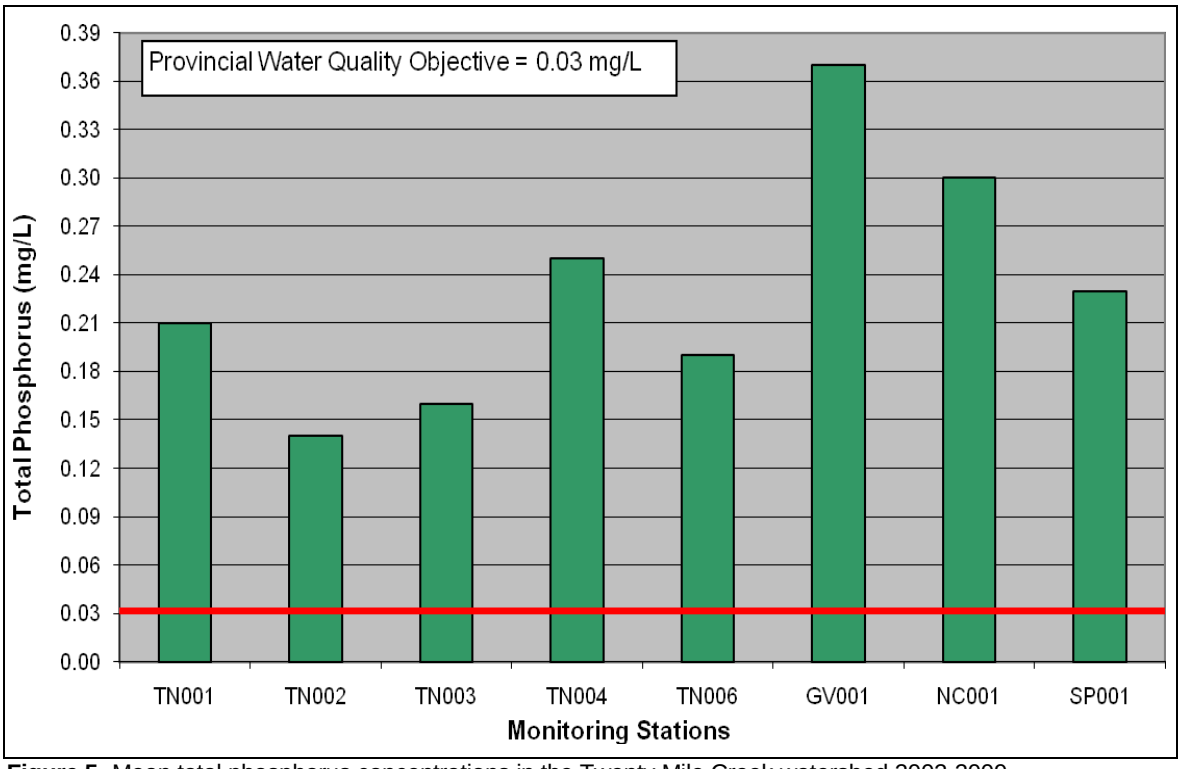

Figure 5: Mean total phosphorus concentrations in the Twenty Mile Creek watershed 2002-2009

- Elevated concentrations of suspended solids are impacting water quality throughout the watershed, particularly in the upper reaches. TN001 receives stormwater from upstream retention ponds and accelerated sedimentation is observed at this site. Sources of suspended solids include runoff from urban and agricultural landuse and soil erosion.
- A *marginal* water quality rating was again obtained at Gavora Ditch station GV001 in 2009. This station was added to the network in 2005 as part of the Twenty Mile Creek Watershed Plan (NPCA 2006a); however, the dataset for this station is very limited due to the intermittent nature of the watercourse and the presence of karst topography. This index rating will likely decrease over time as additional data is collected due to high total phosphorus concentrations.

4.3.2 Twenty Mile Creek Watershed: BioMAP Results

BioMAP results indicate that water quality is *impaired* at most Twenty Mile Creek stations currently monitored (**Table 5**). Results from BioMAP assessments completed between 2001 and 2009 are illustrated in **Appendix B**. Reduced baseflow, high sediment loading due to erosion, lack of in-stream habitat, and nutrient enrichment are primary causes of impairment at these stations. The benthic invertebrate community at station TN001 is also negatively impacted by a non-native invasive snail species. Outlet station TN006 is in the *grey zone* BioMAP category which indicates that water quality is neither *impaired* nor *unimpaired* and that further sampling is required. Continuous flow, groundwater discharge from the Niagara Escarpment, and improved habitat are likely causes for the *grey zone* BioMAP rating obtained at this station.

Table 5: Summary of NPCA water quality data for the Twenty Mile Creek watershed (2001-2009)

STATION	WATERSHED	WQI RATING	BIOMAP RATING	FACTORS AFFECTING WATER QUALITY
TN001	Twenty Mile Creek	Poor	Impaired	• Exceedances of chloride, *E. coli*, total phosphorus, suspended solids, copper and zinc • High sediment loading from upstream stormwater retention ponds • Benthic community consists mainly of worms and is consistent with nutrient enrichment • Site invaded by the non-native Chinese Mystery Snails • Algae observed during the summer months
TN002	Twenty Mile Creek	Poor	Impaired	• Exceedances of *E. coli*, total phosphorus, copper and zinc • Nutrient enrichment from upstream agricultural areas • Sediment loading evident from upstream erosion and runoff • Lack of adequate riparian buffer • Algae observed during the summer months
TN00	Twenty Mile Creek	Poor	Impai	• Exceedances of chloride, *E. coli*, total phosphorus, copper and zinc • Algae observed during the summer months
TN004	Twenty Mile Creek	Poor	Impaired	• Exceedances of chloride, *E. coli*, total phosphorus, suspended solids and zinc • Algae observed during the summer months
TN006	Twenty Mile Creek	Poor	Grey Zone	• Exceedances of chloride, total phosphorus and *E. coli* • Adequate upstream forest buffer • Some severe erosion noted along sample reach • Site supports sensitive taxa such as caddisflies and water pennies • Algae observed during the summer months
NC001	North Creek	Poor	Impaired	• Exceedances of *E. coli*, total phosphorus and suspended solids • Nutrient enrichment from upstream agricultural areas • Watercourse lacking adequate upstream forest and riparian buffer • Algae observed during the summer months
SP001	Spring Creek	Poor	Impaired	• Exceedances of *E. coli* and total phosphorus • Nutrient enrichment from upstream agricultural areas • Site is vulnerable to intermittent baseflow and water stagnation • Algae observed during the summer months
GV001	Gavora Ditch	Marginal	Impaired	• Exceedances of total phosphorus • This section of the watercourse supports sensitive taxa such as caddisflies • Low baseflow conditions in summer (intermittent due to karst) • Nutrient enrichment from upstream agricultural areas • Algae observed during summer months

4.4 LAKE ONTARIO TRIBUTARIES

Twelve tributaries discharging to Lake Ontario are monitored through the NPCA Water Quality Monitoring Program. These tributaries include: Forty Mile Creek, Eighteen Mile Creek, Sixteen Mile Creek, Fifteen Mile Creek, Twelve Mile Creek, Eight Mile Creek, Six Mile Creek, Four Mile Creek, Two Mile Creek, One Mile Creek, Shriners Creek, and Beaver Dam Creek (**Figure 6**). Outlet stations on Eight, Six and One Mile Creeks in Niagara-On-The-Lake were added to the network in 2009 as part of the NPCA Niagara-On-The-Lake Watershed Restoration Program. Twenty Mile Creek is also a tributary of Lake Ontario but is presented separately due to the relatively large size of the watershed.

4.4.1 LAKE ONTARIO TRIBUTARIES: WATER QUALITY INDEX

As shown in **Table 6**, the calculated Water Quality Index (WQI) for Lake Ontario tributaries ranges from *poor* to *fair*. Upper Twelve Mile Creek station TW006 again achieved a rating of *fair*, eleven stations are rated as *marginal,* and ten stations are rated as *poor* in 2009. WQI results are illustrated in **Appendix A**.

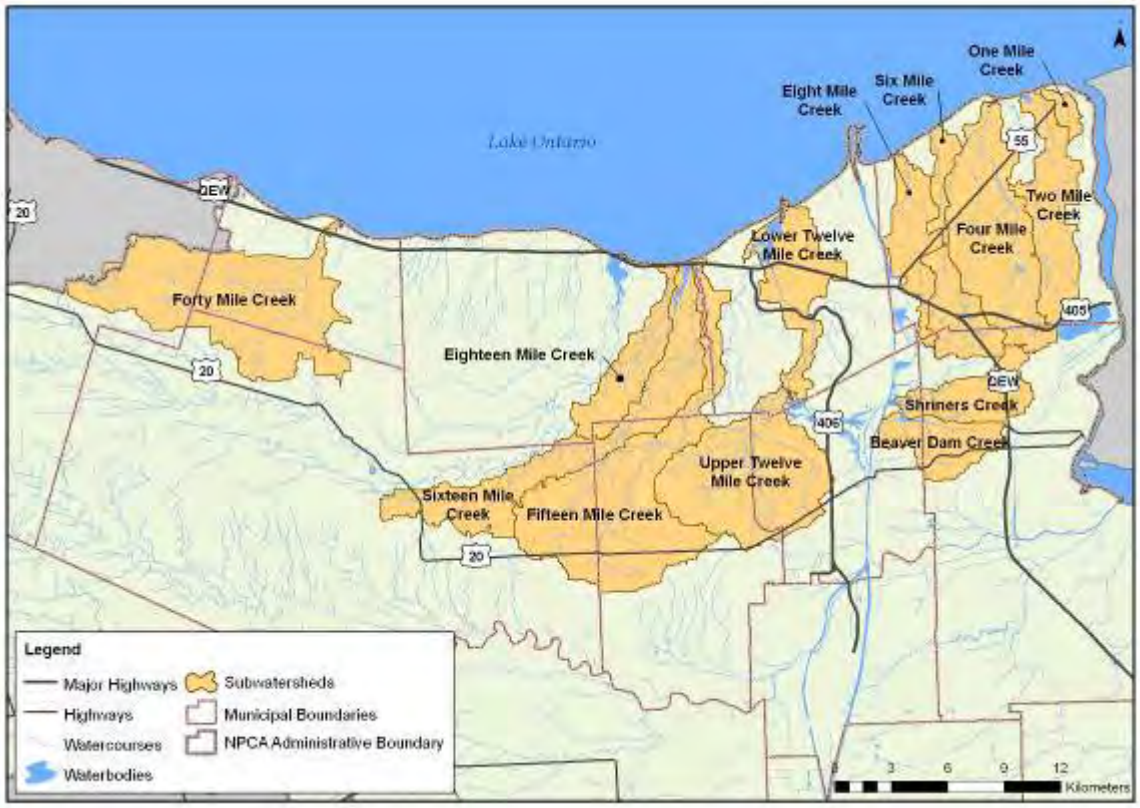

Figure 6: Map of the subwatersheds draining to Lake Ontario that are monitored for water quality

Index results and water quality monitoring data collected from Lake Ontario tributaries between 2003 and 2009 are summarized as follows:

- Water quality at Forty Mile Creek station FM001 is impacted by groundwater discharge from upstream quarry operations. Chloride concentrations frequently exceed the guideline for irrigation quality; however, this is largely attributed to groundwater input. Other potential sources of chloride include road salt applied for de-icing and sewage discharges. Runoff from urban and agricultural landuse results in frequent exceedances of *E. coli* and total phosphorus at this station.
- Four Mile Creek and Two Mile Creek are agricultural watersheds that are primarily impacted by high nutrient concentrations. Nitrate and total phosphorus concentrations routinely exceed water quality objectives. Two Mile Creek is also impacted by high concentrations of chloride and *E. coli*. Sources include sewage discharges, animal waste, and runoff from surrounding landuse. As shown in **Figure 7**, mean total phosphorus concentrations greatly exceed the provincial objective at all stations, particularly Four Mile Creek station FU004.
- Eighteen, Sixteen, and Fifteen Mile Creeks are primarily agricultural watersheds and are impacted by elevated concentrations of chloride and total phosphorus. As shown in **Figure 7**, phosphorus concentrations are especially elevated at Fifteen Mile Creek station FF001 and Sixteen Mile Creek station SX001. Erosion and

sediment loading also result in elevated concentrations of suspended solids at Fifteen Mile Creek station FF001.

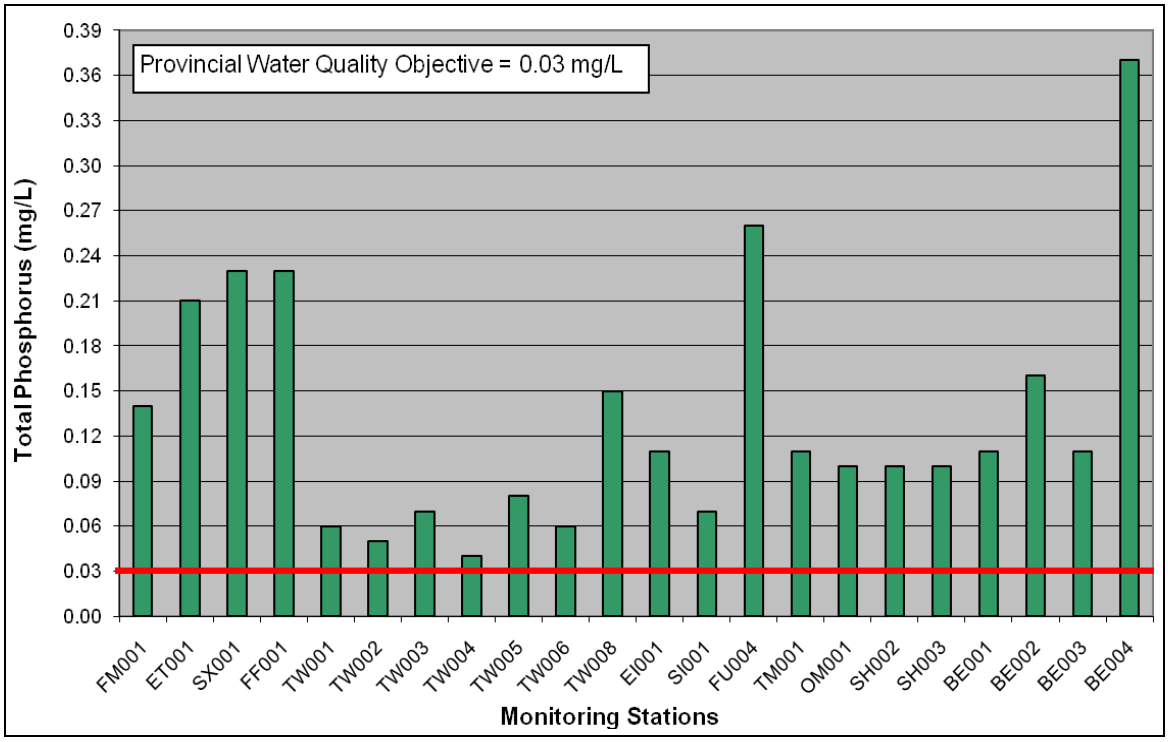

Figure 7: Mean total phosphorus concentrations in Lake Ontario tributaries 2003-2009

- Upper Twelve Mile Creek stations TW001 through TW006 represent some of the best water quality in the Niagara Peninsula; however, they are impacted by frequent exceedances of total phosphorus, *E. coli*, and suspended solids due to high flows, erosion, and runoff from urban and agricultural landuse. These stations are also impacted by high summer water temperatures which exceed the optimal thermal range for brook trout (Michaud and Diamond 2006, 2007).
- Shriners Creek stations SH002 and SH003 are rated as *marginal*; however, there is limited data for these stations since they were added to the network in 2008. These index ratings are expected to change over time as additional data is collected.
- Beaver Dam Creek stations BE001-BE004 were also added to the monitoring network in 2008 and as a result there is limited data available. Index ratings range from *poor* to *fair*; however, these ratings are expected to change over time as additional data is collected. Elevated total phosphorus concentrations were again observed at all Beaver Dam Creek stations in 2009; however, concentrations were notably higher at station BE004 with a mean concentration of 0.37 mg/L.
- Stations EI001 and SI001 on Eight and Six Mile Creeks in Niagara-On-The-Lake also achieved ratings of *marginal*, however, these stations were added to the network in 2009 and as a result there is limited data available. Index ratings are expected to change over time as additional data is collected.

4.4.2 Lake Ontario Tributaries: BioMAP Results

BioMAP results indicate that water quality is *impaired* at most Lake Ontario tributary stations (**Table 6**). Results from BioMAP assessments completed between 2001 and 2009 are illustrated in **Appendix B**. Sediment loading, nutrient enrichment, and the lack of in-stream habitat are the primary causes of impairment at these stations. G*rey zone* results were obtained at stations FM001 and TW005, indicating that water quality assessments are inconclusive and that further sampling is required. Upper Twelve Mile Creek stations TW002, TW004, and TW006 located on the Effingham tributary are rated as *unimpaired*. The Effingham tributary of upper Twelve Mile Creek is the only watercourse in the NPCA watershed that consistently achieves this rating. These sites are able to support several sensitive taxa such as mayflies and stoneflies due to cooler water temperatures, excellent riparian buffer and in-stream habitat, and suitable water quality.

BioMAP assessments were completed for the first time at Beaver Dam Creek stations BE001, BE003 and BE004, Shriners Creek station SH003, Eight Mile Creek station EI001, and Six Mile Creek station SI001. All stations achieved BioMAP ratings of *impaired*. Beaver Dam Creek station BE002 was not sampled due to poor accessibility.

Table 6: Summary of NPCA water quality data for Lake Ontario tributaries (2001-2009)

STATION	WATERSHED	WQI RATING	BIOMAP RATING	FACTORS AFFECTING WATER QUALITY
FM001	Forty Mile Creek	Poor	Grey Zone	• Exceedances of chloride, *E. coli*, and total phosphorus • Adequate upstream forest cover • This section of the watercourse supports some sensitive taxa such as stoneflies and mayflies • Vulnerable to contaminants from upstream urban and agricultural areas • Receives highly mineralized groundwater discharge from an active quarry • Algae observed during summer months
ET001	Eighteen Mile Creek	Poor	Impaired	• Exceedances of chloride, total phosphorus and *E. coli* • Vulnerable to contaminants from upstream agricultural areas • Very low density of benthic invertebrates despite a relative abundance of habitat indicates that degraded water quality is impacting the benthic community
FF001	Fifteen Mile Creek	Poor	Impaired	• Exceedances of chloride, total phosphorus and suspended solids • Algae observed during summer months
SX001	Sixteen Mile Creek	Poor	Impaired	• Exceedances of chloride, total phosphorus, suspended solids, and *E.coli* • Sedimentation caused by upstream erosion • Vulnerable to contaminants from upstream agricultural areas
EI001	Eight Mile Creek	Marginal	Impaired	• Exceedances of total phosphorus and *E. coli* • Vulnerable to contaminants from upstream agricultural areas
SI001	Six Mile Creek	Marginal	Impaired	• Exceedances of chloride, total phosphorus and *E. coli* • Vulnerable to contaminants from upstream agricultural areas
FU004	Four Mile Creek	Poor	Impaired	• Exceedances of nitrate, total phosphorus, suspended solids, and *E. coli* • Lack of adequate riparian buffer • Algae observed during summer months • Vulnerable to contaminants from upstream urban and agricultural areas
TM001	Two Mile Creek	Poor	Impaired	• Exceedances of chloride, *E. coli*, nitrate and total phosphorus • High proportion of shredders indicating an overabundance of aquatic vegetation and suggestive of nutrient enrichment • Vulnerable to contaminants from upstream urban and agricultural areas • Algae observed during summer months
OM001	One Mile	Poor	Impaired	• Exceedances of chloride, total phosphorus and *E. coli*

	Creek			• Vulnerable to contaminants from upstream residential and agricultural areas
TW001	Twelve Mile Creek	Marginal	Impaired	• Exceedances of total phosphorus, suspended solids and *E. coli* • Benthic invertebrate community impacted by lack of adequate riparian buffer and in-stream habitat
TW002	Twelve Mile Creek	Poor	Unimpaired	• Exceedances of total phosphorus, suspended solids and *E. coli* • Excellent upstream forest and riparian buffer • This section of the watercourse supports sensitive taxa such as stoneflies and mayflies
TW003	Twelve Mile Creek	Marginal	Impaired	• Exceedances of total phosphorus and *E. coli* • Good upstream forest and riparian buffer • Benthic invertebrate community impacted by lack of in-stream habitat • Vulnerable to contaminants from upstream urban and agricultural areas
TW004	Twelve Mile Creek	Marginal	Unimpaired	• Exceedances of total phosphorus, nitrate and *E. coli* • Excellent upstream forest and riparian buffer • Vulnerable to contaminants from upstream agricultural areas and golf course • This section of the watercourse supports sensitive taxa such as stoneflies and mayflies
TW005	Twelve Mile Creek	Marginal	Grey Zone	• Exceedances of total phosphorus, *E. coli*, and suspended solids • Excellent upstream forest and riparian buffer • Sedimentation caused by upstream erosion • Vulnerable to contaminants from upstream urban and agricultural areas
TW006	Twelve Mile Creek	Fair	Unimpaired	• Exceedances of total phosphorus, *E. coli*, and suspended solids • Excellent upstream forest and riparian buffer • This section of the watercourse supports sensitive taxa such as stoneflies and mayflies • Channel morphology indicative of conditions that are in equilibrium with • stream flow and sediment discharge
TW008	Twelve Mile Creek	Poor	Impaired	• Exceedances of chloride, total phosphorus and *E.coli* • Low baseflow conditions in summer • Vulnerable to contaminants from upstream agricultural areas
SH002	Shriners Creek	Marginal	Impaired	• Exceedances of chloride, total phosphorus and *E.coli* • Located immediately downstream of NPCA constructed wetland designed or stormwater management • Algae observed during summer months • Vulnerable to contaminants from upstream urban areas
SH003	Shriners Creek	Marginal	Impaired	• Exceedances of chloride, total phosphorus, *E.coli* and suspended solids • Adequate upstream forest and riparian buffer in some reaches • Vulnerable to contaminants from upstream urban and agricultural areas
BE001	Beaver Dam Creek	Marginal	Impaired	• Exceedances of chloride, total phosphorus and *E.coli* • Algae observed during summer months • Vulnerable to contaminants from upstream agricultural areas
BE002	Beaver Dam Creek	Fair	n/a	• Exceedances of total phosphorus and suspended solids • Stream channel flows into large on-line pond at this station resulting in dilution • Vulnerable to contaminants from upstream agricultural areas and golf course
BE003	Beaver Dam Creek	Poor	Impaired	• Exceedances of chloride, total phosphorus, *E. coli*, suspended solids and metals • Lack of adequate riparian buffer • Algae observed during summer months • Vulnerable to contaminants from upstream urban areas
BE004	Beaver Dam Creek	Marginal	Impaired	• Exceedances of total phosphorus and *E. coli* • Adequate riparian buffer • Vulnerable to contaminants from upstream industrial areas

4.5 NIAGARA RIVER TRIBUTARIES

Four tributaries discharging to the Niagara River are monitored through the NPCA Water Quality Monitoring Program. These tributaries include: Bayer Creek, Black Creek, Frenchman's Creek, and Usshers Creek (**Figure 8**).

4.5.1 NIAGARA RIVER TRIBUTARIES: WATER QUALITY INDEX

Based on the results of the Water Quality Index (WQI) most Niagara River tributary stations are rated as having *poor* water quality (**Table 7**). Bayer Creek station BA001 is rated as having *marginal* water quality. WQI results are illustrated in **Appendix A**. Index results and water quality monitoring data collected from Niagara River tributaries between 2003 and 2009 are summarized as follows:

- Water quality is negatively impacted by high concentrations of total phosphorus with 100% exceedance observed at all stations. As shown in **Figure 9**, mean total phosphorus concentrations exceed the provincial objective at all stations, particularly at Usshers Creek station US001. Sources of phosphorus at these stations include runoff from urban and agricultural landuse, sewage discharges, and soil erosion.

Figure 8: Map of the subwatersheds monitored for water quality in the Niagara River watershed outside of the Welland River

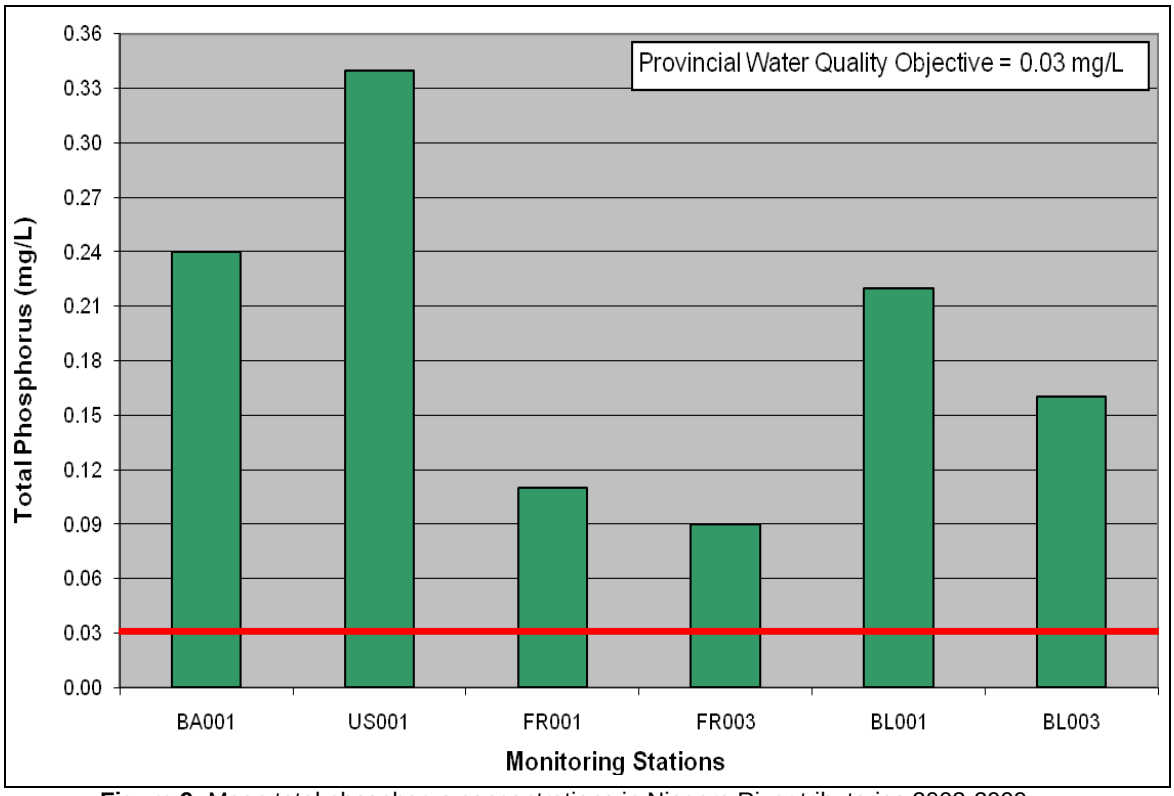

Figure 9: Mean total phosphorus concentrations in Niagara River tributaries 2003-2009

- Elevated concentrations of *E. coli* are frequently observed at stations BL001, FR001 and FR003. Sources of *E. coli* at these stations include sewage discharges, animal waste, and runoff from urban and agricultural landuse.
- Water quality at Frenchman's Creek station FR003 is influenced by discharge from an upstream retention pond which collects stormwater and washwater from a horse racing facility. Runoff from surrounding landuse may also contribute to elevated concentrations of chloride and nutrients at this station.
- A *marginal* water quality rating was again obtained at Bayer Creek station BA001 in 2009. This station was added to the network in 2006 as part of the South Niagara Falls Watershed Plan and as a result the dataset for this station is limited. This index rating may change as additional data is collected.

4.5.2 Niagara River Tributaries: BioMAP Results

BioMAP results indicate that water quality is *impaired* at all Niagara River tributary stations (**Table 7**). Results from BioMAP assessments completed between 2001 and 2009 are illustrated in **Appendix B**. Sediment loading, reduced baseflow, lack of in-stream habitat, and nutrient enrichment are primary causes of impairment at these stations. BioMAP samples have not been collected from station BL003 due to high water depth, channel morphology, and access restrictions.

Table 7: Summary of NPCA water quality data for Niagara River tributaries (2001-2009)

STATION	WATERSHED	WQI RATING	BIOMAP RATING	FACTORS AFFECTING BIOMAP RATING
BA001	Bayer Creek	Marginal	Impaired	• Exceedances of chloride, total phosphorus and *E. coli* • Nutrient and chloride enrichment from upstream urban and agricultural areas • Lack of riparian buffer
BL001	Black Creek	Poor	Impaired	• Exceedances of *E. coli*, total phosphorus and suspended solids • Benthic community indicative of warm water conditions • Nutrient enrichment from upstream agricultural areas • Site is vulnerable to low baseflow and water stagnation
BL003	Black Creek	Poor	n/a	• Exceedances of total phosphorus
FR001	Frenchman's Creek	Poor	Impaired	• Exceedances of *E. coli*, total phosphorus and suspended solids • Sediment loading due to upstream erosion and runoff • Vulnerable to contaminants from upstream urban and agricultural areas • Algae observed during summer months
FR003	Frenchman's Creek	Poor	Impaired	• Exceedances of chloride, *E. coli* and total phosphorus • Site receives discharge from upstream retention pond • Vulnerable to contaminants from upstream urban and agricultural areas • Algae observed during summer months
US001	Usshers Creek	Poor	Impaired	• Exceedances of total phosphorus and chloride • Benthic community consists mainly of worms that are consistent with nutrient enrichment • Site is vulnerable to low baseflow and stagnation • Algae observed during summer months

4.6 LAKE ERIE TRIBUTARIES

Eight tributaries discharging to Lake Erie are monitored through the NPCA Water Quality Monitoring Program. These tributaries include: Beaver Dam Creek, Casey Drain, Eagle Marsh Drain, Krafts Drain, Low Banks Drain, Point Abino Drain, Six Mile Creek, and the Wignell Drain (**Figure 10**). These stations were added as part of the Lake Erie North Shore Watershed Plan, which was initiated by the NPCA in 2007. Water quality is also monitored at the Wainfleet Wetlands Conservation Area, which is a large abandoned quarry that is owned by the NPCA.

4.6.1 LAKE ERIE TRIBUTARIES: WATER QUALITY INDEX

Based on the results of the Water Quality Index (WQI) three of nine Lake Erie tributary stations are rated as having *poor* water quality, four stations are rated as *margina*l, station PA001 is rated as *fair*, and station WW001 is rated as *good* (**Table 8**). WQI results are illustrated in **Appendix A**.

Index results and water quality monitoring data collected from Lake Erie tributaries between 2007 and 2009 are summarized as follows:

- Water quality is negatively impacted by high concentrations of total phosphorus with exceedances observed at all stations. As shown in **Figure 11**, mean total phosphorus concentrations exceed the provincial objective at all stations, particularly at Wignell Drain station WD001 and Casey Drain station CD001.

Sources of phosphorus at these stations include runoff from urban and agricultural landuse, sewage discharges, and soil erosion. Wainfleet Wetlands Conservation Area station WW001 again has the lowest mean total phosphorus concentration of all stations monitored in 2009.

Figure 10: Map of the subwatersheds monitored for water quality along the north shore of Lake Erie

- Elevated concentrations of *E. coli* are frequently observed at most stations. Sources of *E. coli* at these stations include sewage discharges, animal waste, and runoff from urban and agricultural landuse.
- Water quality at Eagle Marsh Drain station EM001 and Wignell Drain station WD001 is influenced by discharge from bedrock quarries located upstream. Chloride concentrations frequently exceed the guideline for irrigation quality at station EM001; however, this is largely attributed to groundwater input. Other potential sources of chloride include road salt applied for de-icing and sewage discharges.
- Wainfleet Wetlands Conservation Area station WW001 has achieved the highest water quality index rating for the second year in a row. Water quality at this station is improved by inflow from groundwater and Lake Erie.
- Generally, the WQI ratings obtained at Lake Erie tributary stations are higher than other parts of the NPCA watershed; however, it is important to note that these stations were recently added to the network in 2007. As such, the datasets for these stations are limited and these index ratings may change as additional data is collected.
- Nickel is not included in the WQI calculation; however, nickel concentrations were found to frequently exceed the Provincial Water Quality Objective at Beaver Dam Creek station BD001 and Wignell Drain station WD001.

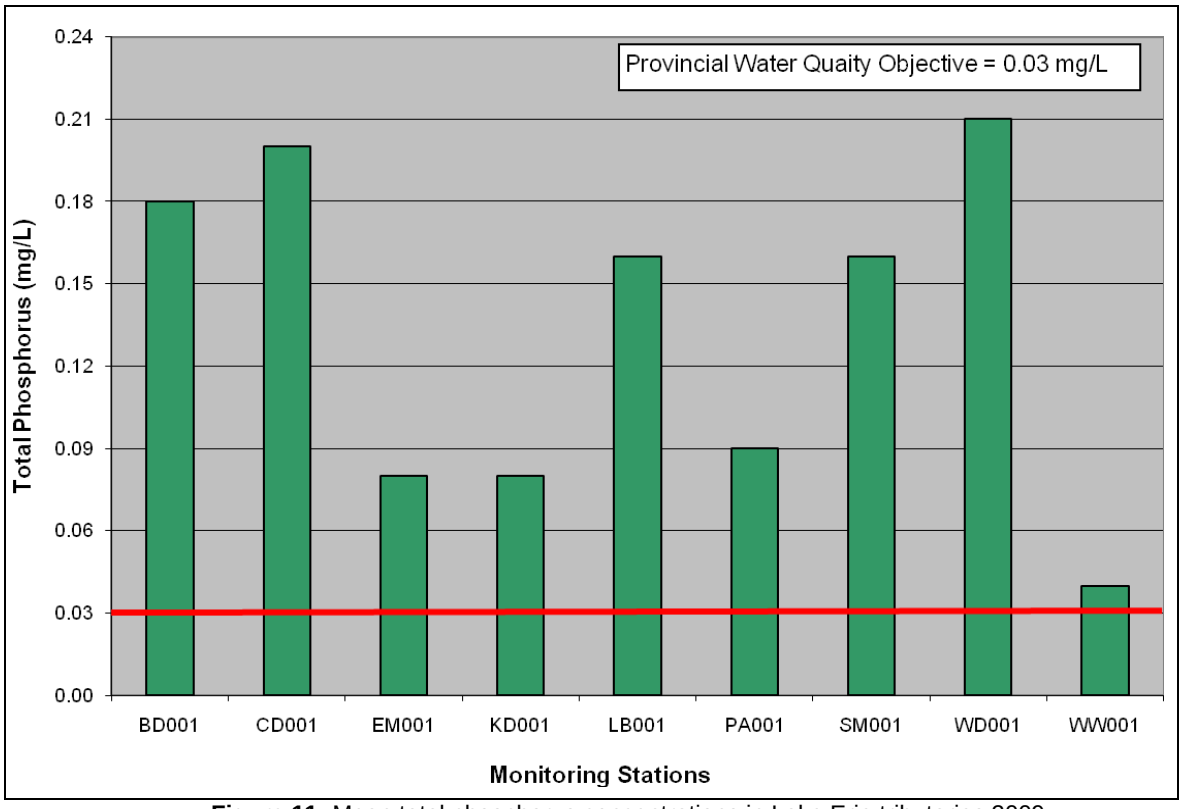

Figure 11: Mean total phosphorus concentrations in Lake Erie tributaries 2009

4.6.2 Lake Erie Tributaries: BioMAP Results

BioMAP results indicate that water quality is *impaired* at most Lake Erie tributary stations (**Table 8**). Results from BioMAP assessments for these stations are illustrated in **Appendix B**. Sediment loading, reduced baseflow, lack of in-stream habitat, and nutrient enrichment are primary causes of impairment at these stations. BioMAP samples have not been collected from stations SM001 and WW001 due to high water depth, channel morphology, and access restrictions.

Table 8: Summary of NPCA water quality data for Lake Erie tributaries (2001-2009)

Station	Watershed	WQI Rating	BioMAP Rating	Factors Affecting Water Quality
BD001	Beaver Dam Drain	Poor	Impaired	• Exceedances of copper, total phosphorus and *E. coli* • Frequent nickel exceedances • Nutrient enrichment from upstream urban and agricultural areas • Lack of riparian buffer
CD001	Casey Drain	Marginal	Impaired	• Exceedances of *E. coli*, total phosphorus and suspended solids • Nutrient enrichment from upstream urban and agricultural areas • Site is vulnerable to low baseflow and water stagnation • Algae observed during summer months • Lack of riparian buffer
EM001	Eagle Marsh Drain	Poor	Impaired	• Exceedances of chloride, *E. coli*, total phosphorus and suspended solids • Nutrient enrichment from upstream urban and agricultural areas • Site is influenced by groundwater discharge from upstream bedrock quarry

KD001	Krafts Drain	Poor	Impaired	• Exceedances of *E. coli*, total phosphorus and suspended solids • Nutrient enrichment from upstream urban and agricultural areas • Algae observed during summer months
LB001	Low Banks Drain	Marginal	Impaired	• Exceedances of *E. coli* and total phosphorus • Nutrient enrichment from upstream urban and agricultural areas • Site is vulnerable to low baseflow and water stagnation • Severe algae growth observed during summer months • Lack of riparian buffer
PA001	Point Abino Drain	Fair	Impaired	• Exceedances of total phosphorus • Nutrient enrichment from upstream urban and agricultural areas • Site is influenced by backflow from Lake Erie
SM001	Six Mile Creek	Marginal	n/a	• Exceedances of *E. coli* and total phosphorus • Nutrient enrichment from upstream urban and agricultural areas
WD001	Wignell Drain	Marginal	Grey Zone	• Exceedances of copper, *E. coli* and total phosphorus • Frequent nickel exceedances • Nutrient enrichment from upstream urban and agricultural areas • Site is influenced by groundwater discharge from upstream bedrock quarry
WW001	Wainfleet Wetlands Conservation Area	Good	n/a	• Exceedances of total phosphorus • Nutrient enrichment from upstream urban and agricultural areas

5.0 OTHER PROJECTS

5.1 HAMILTON INTERNATIONAL AIRPORT

Since 1998 the NPCA has completed annual biological assessments of water quality for Hamilton International Airport (HIA). The goal of the annual assessment is to determine if stormwater runoff and de-icing fluids such as propylene glycol are impacting surface water quality in two headwater tributaries of the Welland River. The annual biomonitoring is part of the airport's commitment to fulfilling a recommendation in the Niagara River Remedial Action Plan to improve degraded water quality in the Welland River. Data collected by the NPCA since 1998 indicates that water quality in the upper Welland River is impaired due to stormwater runoff and propylene glycol management practices at HIA, and improvements to these practices are strongly recommended in order to improve water quality. The NPCA will continue its annual monitoring for HIA in 2010.

5.2 GLANBROOK LANDFILL

Since 1996 the NPCA has completed bi-ennial biological assessments of water quality for the Glanbrook Landfill. The Glanbrook Landfill is owned and operated by the City of Hamilton, and is designed to receive domestic, commercial, and non-hazardous solid industrial waste. The purpose of the bi-ennial assessments is to determine if stormwater runoff and leachate from the landfill are negatively impacting water quality and aquatic biota in the Welland River and Buckhorn Creek. Results from NPCA assessments indicate that water quality in these watercourses has improved since 1996, with limited landfill impacts observed in 1996 and no impacts observed from 1998 through to 2008. The NPCA will continue its bi-ennial monitoring for the Glanbrook Landfill in 2010.

5.3 INTERNAL PROJECTS

The NPCA Water Quality Program is currently involved with several internal monitoring projects completed jointly with other NPCA programs. Joint internal projects that were active in 2009 are summarized in **Table 9**.

Table 9: Summary of joint projects completed between the NPCA Water Quality Program and other NPCA programs

PROJECT DESCRIPTION	NPCA PROGRAMS INVOLVED
Nitrate investigation at PGMN monitoring well # W0000361-2	Water Quality Monitoring, Source Water Protection
Monthly stream flow monitoring at water quality monitoring stations on the Welland River, upper 12-Mile Creek, and Niagara-On-The-Lake watersheds	Water Quality Monitoring, Restoration, Regulation, Source Water Protection

5.4 WELLAND RIVER EUTROPHICATION STUDY

The Welland River Eutrophication Study was initiated by the NPCA in 2008 in partnership with the MOE and Environment Canada as part of the Niagara River Remedial Action Plan (RAP). Eutrophication and nuisance algae are listed in the Niagara River RAP as a Beneficial Use Impairment for the Welland River. The objectives of the Welland River Eutrophication Study are to gather missing data about how the Welland River ecosystem is responding to nutrient inputs, set delisting criteria for key parameters in the river, and set targets for tributary loads to meet the delisting criteria. The completion date for the Study is 2010.

5.5 LAKE ONTARIO COLLABORATIVE STUDY

The NPCA Water Quality Monitoring Program is participating in the Lake Ontario Collaborative Drinking Water Study lead by Environment Canada. The objective of this program is to gather hydrologic and water quality data to determine pollutant loadings which will be used to evaluate risks to drinking water intakes located along the Lake Ontario shoreline. Pollutant loadings will also be used to evaluate changes in the nearshore ecology of the lake. This data will also be used for the calibration of the Soil and Water Assessment Tool (SWAT) watershed model that Environment Canada is planning to use for its future projects. The NPCA's role in this study is to monitor the water quality of Twenty Mile Creek using an ISCO auto-sampler with the goal of sampling wet-weather events that occur in this watershed. The NPCA captured a total of 14 and 23 sampling events in 2008 and 2009, respectively. The study is now complete and the auto-sampler has been removed from Twenty Mile Creek for use in other projects. A final report outlining the results of the study is currently being prepared by Environment Canada.

6.0 GROUNDWATER QUALITY MONITORING PROGRAM

6.1 PROVINCIAL GROUNDWATER MONITORING NETWORK

The Provincial Groundwater Monitoring Network (PGMN) is a province-wide groundwater monitoring initiative designed to collect long-term baseline data on groundwater quantity and quality in special areas of interest. Groundwater is monitored through a network of monitoring wells located throughout the NPCA watershed in locally significant hydrogeologic areas. The NPCA currently operates 15 monitoring wells in

partnership with the MOE as part of the PGMN (**Table 10**). Monitoring wells are instrumented with datalogging equipment which record hourly groundwater levels at all stations. Groundwater quality samples are collected twice yearly from 13 of the 15 wells during the spring and fall, and analyzed for nutrients, metals, bacteria, and general chemistry. Refer to **Appendix C** for NPCA groundwater monitoring locations.

The first round of groundwater quality samples were collected by the NPCA and MOE between 2002 and 2004 and analyzed by the MOE laboratory for a wide range of parameters including metals, nutrients, volatile organic compounds (VOCs), pesticides and general chemistry. Results from the first round of sampling generally indicate that water quality is good relative to natural bedrock conditions. VOCs and pesticides were not detected in any first round samples.
Routine groundwater quality sampling was initiated in 2006, and samples are collected annually by the NPCA during the spring and fall seasons. Groundwater quality samples are analyzed for bacteria, nutrients, metals, and general chemistry. Trends in groundwater quality are difficult to interpret at this time due to the limited size of the dataset; however, preliminary data collected to date indicates the following:

- Elevated concentrations of boron, fluoride, and selenium observed in bedrock wells may be attributed to natural groundwater conditions.
- Elevated sodium concentrations may be attributed to natural groundwater conditions; however, they may also be attributed to urban landuse and road de-icing in some areas.
- Elevated nitrate concentrations observed at monitoring wells W0000384 and W0000361-2 are likely attributed to agricultural landuse and/or faulty septic systems.

Table 10: NPCA Provincial Groundwater Monitoring Network stations

STATION	HYDROGEOLOGIC AREA OF INTEREST	MUNICIPALITY
W0000073	Guelph-Lockport Formation	Town of Grimsby
W0000080	Guelph-Lockport Formation	Township of West Lincoln
W0000287	Salina Formation	Haldimand County
W0000288	Guelph-Lockport Formation	City of Hamilton (Glanbrook)
W0000289	Onondaga Formation	City of Port Colborne
W0000290	Salina Formation	City of Niagara Falls
W0000341	Irondequoit Formation	Town of Lincoln
W0000356-2	St. David's Buried Gorge	City of Niagara Falls
W0000356-3	St. David's Buried Gorge	City of Niagara Falls
W0000357	Fonthill Kame-Delta Complex	Town of Pelham
W0000361-2	Fonthill Kame-Delta Complex	Town of Pelham
W0000361-3	Fonthill Kame-Delta Complex	Town of Pelham
W0000362-2	Fonthill Kame-Delta Complex	Town of Pelham
W0000362-3	Fonthill Kame-Delta Complex	Town of Pelham
W0000384	Iroquois Sandplain	Town of Niagara-On-The-Lake

Exceedances of the Ontario Drinking Water Standards (MOE 2003) are flagged by the MOE and are reported to the NPCA, Region of Niagara Public Health Department, and

local municipalities. Wells with reported exceedances are subsequently re-sampled by the MOE to confirm the initial exceedance. Confirmed exceedances of the Ontario Drinking Water Standards (MOE 2003) at NPCA PGMN wells sampled between 2002 and 2009 are summarized in **Table 11**.

Table 11: Summary of confirmed exceedances of Ontario Drinking Water Standards at NPCA PGMN wells

STATION	PARAMETER EXCEEDED	PROBABLE SOURCE(S)
W0000080	Fluoride, Sodium	Natural groundwater conditions
W0000287	Sodium	Natural groundwater conditions
W0000288	Sodium	Natural groundwater conditions
W0000290	Boron, Sodium, Selenium	Natural groundwater conditions
W0000341	Sodium, Selenium	Natural groundwater conditions
W0000361-2	Nitrate	Agricultural landuse, faulty septic systems
W0000361-3	Sodium	Natural groundwater conditions
W0000362-2	Sodium	Urban landuse, road de-icing
W0000384	Nitrate, Sodium, Selenium	Agricultural landuse

6.2 NITRATE INVESTIGATION AT PGMN WELL W0000384

Additional groundwater sampling was completed by the NPCA in partnership with the Region of Niagara Public Health Unit in October 2008. The purpose of the additional sampling was to determine the extent of nitrate contamination in the vicinity of PGMN well W0000384, and notify affected residents of potential health concerns related to elevated nitrate concentrations in drinking water. Eleven private wells were sampled from residences located in close proximity to well W0000384 and analyzed for several parameters, including nitrate. Sampling results indicate that none of the private wells tested exceed the Ontario Drinking Water Standard for nitrate (MOE 2003). Isotopic analysis completed by the NPCA at well W0000384 in October 2008 suggests that the source of nitrate at this site is animal manure rather than faulty septic systems.

6.3 NITRATE INVESTIGATION AT PGMN WELL W0000361-2

Additional groundwater sampling was completed by the NPCA in partnership with the Region of Niagara Public Health Unit in November 2009. The purpose of the additional sampling was to determine the extent of nitrate contamination in the vicinity of PGMN well W0000361-2, and notify affected residents of potential health concerns related to elevated nitrate concentrations in drinking water. A total of 61 residents living within a 1 km radius of well W0000361-2 were invited to participate in this voluntary water well survey and 39 residents agreed to participate.

In the first phase of the investigation, 44 wells from 39 private residences were sampled and analyzed for nitrate in the field using an inexpensive nitrate test kit. Results from this first phase of sampling indicated that ten of the 44 wells (23%) had detectable concentrations of nitrate (i.e. > 2 mg/L). The ten wells identified in the first phase as having detectable concentrations of nitrate were subject to secondary testing and laboratory analysis in the second phase of the investigation. Laboratory analysis confirmed that these wells had detectable concentrations of nitrate, and one well was found to exceed the Ontario Drinking Water Standard of 10 mg/L (MOE 2003). This well is a shallow dug well with poor construction, and is likely not related to the nitrate exceedance at PGMN well W0000361-2. The average nitrate concentration from the second round of confirmatory

testing was found to be 6 mg/L. Letter notifications were mailed to participating residents to provide them with their testing results and also provide additional information regarding well testing.

6.4 Water Well Decommissioning Program

In 2007 the NPCA implemented the Water Well Decommissioning Program to provide grants to watershed residents interested in properly decommissioning abandoned water wells on their property. The grant program offers a 90% subsidy for water well decommissioning to a maximum of $2,000 per well. Grant applications are prioritized in areas designated as highly susceptible to groundwater contamination in the NPCA Groundwater Study (Waterloo Hydrogeologic Inc. 2005), areas where there is a high density of private wells used for domestic purposes, and areas where a watershed plan has been completed or is underway. Numerous improperly abandoned water wells are known to exist in the NPCA watershed, and these wells can serve as a direct pathway between potential contaminants at ground surface and deeper aquifers. The implementation of this program will reduce the risk of groundwater contamination and fulfills a recommendation made in the Groundwater Management Strategy of the NPCA Groundwater Study (Waterloo Hydrogeologic Inc. 2005).

6.5 NPCA Groundwater Study

The NPCA Groundwater Study was completed in 2005 and contains several recommendations aimed at improving the management and protection of local groundwater resources. Since 2005, a number of these recommendations have been addressed through various NPCA programs. Three of the outstanding recommendations from 2008 were addressed in 2009, and include:

- Laying the groundwork for determining cistern use in Niagara,
- Completing the Tier 1 Water Budget and delineating sensitive groundwater recharge areas (SGRAs), and
- Identifying and geo-referencing managed lands and livestock density. Managed lands are defined as areas where fertilizers, non-agricultural source material and manure are applied and may include areas where livestock is present.

A summary of the NPCA Groundwater Study recommendations and follow-up actions is provided in **Tables 12** and **13** (Waterloo Hydrogeologic Inc. 2005).

7.0 Conclusions

The NPCA Water Quality Monitoring Program was implemented in 2001 and is operated in partnership with the Ministry of the Environment, Regional Municipality of Niagara, and City of Hamilton. Through these partnerships the NPCA collects water quality samples and the partnering agencies provide laboratory analysis. Surface water quality samples are collected monthly at 68 monitoring stations located throughout the NPCA watershed and analyzed using several indicator parameters including: chloride, nitrate, total phosphorus, suspended solids, copper, lead, zinc, and *E. coli*. These indicator parameters were used to calculate the CCME Water Quality Index (WQI), which provides a descriptive water quality rating for each station. Benthic invertebrate samples are collected annually throughout the watershed during the spring and fall seasons to assess stream health using the BioMAP protocol.

In general, water quality monitoring data collected between 2001 and 2009 is summarized as follows:

- Based on the results of the 2009 WQI, 65% of the NPCA surface water monitoring stations have water quality rated as *poor*, 30% are rated as *marginal*, 4% are rated

as *fair*, and 1% are rated as *good*. None of the stations were able to achieve a WQI rating of *excellent*.

- Based on the results of the 2009 BioMAP assessments, 81% of the NPCA BioMAP stations have water quality rated as *impaired*, 7% are rated as *grey zone*, 5% are rated as *unimpaired*, and 7% have not been assessed.
- The Effingham tributary of upper Twelve Mile Creek continues to achieve one of the highest water quality ratings in the NPCA watershed, with a WQI rating of *fair* and BioMAP rating of *unimpaired*.
- Total phosphorous concentrations frequently exceed the provincial objective at all 68 monitoring stations. Based on the data collected to date, elevated concentrations of total phosphorus are the most frequent and widespread cause of water quality impairment in the NPCA watershed. The relative high frequency and magnitude of these exceedances was a driving factor in lowering the WQI at all stations.
- Exceedances of nitrate are observed at some stations, most notably Two Mile Creek, Four Mile Creek, and portions of upper Twelve Mile Creek and the Welland River.
- Exceedances of chloride and copper are observed at some stations; however, they are relatively infrequent. Exceedances of lead are rare.
- Exceedances of zinc are frequently observed in the upper Welland River in the vicinity of Hamilton International Airport. The NPCA is currently working with the MOE and the airport to improve water quality.
- Exceedances of suspended solids and *E. coli* are frequently observed at several stations throughout the watershed.
- WQI and BioMAP results generally match up well at most stations (i.e. where the WQI rating is *poor* the BioMAP rating is *impaired*) indicating that the benthic invertebrate data supports the chemical data. Instances where the WQI and BioMAP ratings did not match up may be attributed to factors which are beyond the scope of this analysis such as the availability of in-stream habitat, size of the dataset used to calculate the WQI, and influence of parameters not monitored by the NPCA.
- Data collected from PGMN monitoring wells indicates that groundwater quality generally meets Ontario Drinking Water Standards (MOE 2003). Exceedances of boron, selenium, sodium and fluoride are attributed to natural bedrock conditions. Nitrate exceedances are attributed to agricultural landuse or faulty septic systems.
- A nitrate investigation completed in the vicinity of PGMN well W0000361-2 determined that 98% of private wells in the study area meet the Ontario Drinking Water Quality Standard for nitrate. 1 well out of 44 wells tested exceeded the drinking water standard; however, this well is shallow and poorly constructed and is likely not related to the nitrate exceedance at PGMN well W0000361-2.

Table 12: Summary of NPCA Groundwater Study watershed-wide recommendations and follow-up actions

Study Recommendations	Follow-up Action(s) by NPCA
Ensure that the database created as part of the NPCA Groundwater Study be consistently maintained and regularly updated centrally.	• This recommendation is difficult to fulfill since: 1) updates to the database are contingent on updates to the MOE Water Well Information System and 2) WHI did not provide clear documentation of the digital information provided. However: • Groundwater quality data is housed in a central Access database, • Hydrogeoanalyst software was recently purchased for storing borehole data, and • All NPCA datapoints are georeferenced.
Update water well information for approximately 6500 water well records that could not be used in this study due to high uncertainty related to location and/or elevation by providing UTM coordinates and/or elevation information where possible.	• None
Develop a geology and hydrogeology reference package for use by local drillers during water well drilling and borehole logging to improve the quality of water well record information.	• None
Perform regular detailed reviews of permitted groundwater withdrawals with emphasis on the large users' maximum permitted rates in order to track total groundwater use in the watershed.	• The NPCA completes reviews of Permits To Take Water when circulated by MOE. • Groundwater reviews are completed by the NPCA for site specific projects (e.g. supplying MOE with local information which may affect their review including wetlands, sensitive recharge areas and stressed subwatersheds).
Investigate groundwater use and water budgets on a sub-watershed level to provide additional information on recharge areas that supply baseflow discharge and estimates of aquifer yield to aid in the evaluation of Permit to Take Water applications and review of development applications.	• The Tier 1 Water Budget and delineation of SGRAs have been completed by the NPCA at the watershed planning area level through the Source Water Protection Program.
Better define areas of naturally poor groundwater quality relative to private potable supplies.	• Ambient groundwater quality monitoring in hydrogeologic areas of interest through the PGMN, and • Investigative sampling of private wells in areas surrounding PGMN nitrate exceedances in partnership with Region of Niagara Public Health Unit.
Determine cistern use in order to produce a more accurate estimate of total domestic groundwater use in the watershed.	• The NPCA has developed a database for storing information regarding rural water use. • Water well surveys completed as part of the nitrate investigations at PGMN wells provide accurate information regarding domestic groundwater use in those areas.
Update the potential contaminant sources inventory database and mapping by completing the following tasks: 1) Geo-reference biosolids spreading locations permitted by the MOE within the City of Hamilton and Haldimand County, 2) Identify and geo-reference the other types of potential contaminant sources listed in Section 5.4.18: urban point sources such as unreported spills, residential heating oil tanks, fertilizer, pesticide, and herbicide storage and distribution centres, and snow dumps, and 3) Develop a water well decommissioning program that identifies and geo-	1) None 2) Developed mapping of managed lands and livestock density. Managed lands are defined as areas where fertilizers, non-agricultural source material and manure are applied and may include areas where livestock is present. 3) Watershed-wide water well decommissioning grant program developed and implemented by the NPCA in 2007. Decommissioned wells are georeferenced and housed in NPCA database.

references improperly abandoned wells, and offers incentives to landowners for proper water well decommissioning.	
Improve understanding of local hydrogeology through long-term monitoring of groundwater quality and quantity.	• Long-term monitoring of groundwater quality and quantity in hydrogeologic areas of interest through the PGMN

Table 13: Summary of NPCA Groundwater Study recommendations for hydrogeologically sensitive areas and follow-up actions

Study Recommendations	Follow-up Action(s) by NPCA
Develop specific Groundwater Management and Protection Strategies for the identified hydrogeologically sensitive areas, and areas of medium or high groundwater intrinsic susceptibility.	• The NPCA requires preparation of Hydrogeologic Assessments for development at (i) Vulnerable (quality) and Sensitive (recharge) areas or (ii) areas with private servicing as per the Provincial Policy Statement. • The NPCA has prepared a document titled "Guidelines for Hydrogeology Studies" to direct studies. Note: only high susceptibility areas are included at this time.
Complete a thorough contaminant sources inventory across all areas that are mapped as medium or high susceptibility.	• The NPCA Source Water Protection program may complete these inventories within highly vulnerable aquifers; however, it is not mandatory at this time.
Complete a review of permitted land uses such as industrial, commercial, and extractive industrial located in medium or high susceptibility areas.	• The NPCA requires preparation of Hydrogeologic Assessments for development at (i) Vulnerable (quality) and Sensitive (recharge) areas or (ii) areas with private servicing as per the Provincial Policy Statement. • The NPCA has prepared a document titled "Guidelines for Hydrogeology Studies" to direct studies. Note: only high susceptibility areas are included at this time.
Require a site-specific hydrogeological assessment as a condition of development in medium or high susceptibility areas.	• The NPCA requires preparation of Hydrogeologic Assessments for development at (i) Vulnerable (quality) and Sensitive (recharge) areas or (ii) areas with private servicing as per the Provincial Policy Statement. • The NPCA has prepared a document titled "Guidelines for Hydrogeology Studies" to direct studies. Note: only high susceptibility areas are included at this time.
Develop septic system planning initiatives, and education and awareness programs in medium or high susceptibility areas.	• The NPCA recommends the installation of on-site sewage systems that provide tertiary treatment in vulnerable groundwater areas. Inter-agency cooperation is required to ensure that this recommendation becomes a mandatory requirement.
Improve the understanding of local geology and hydrogeology in hydrogeologically sensitive areas.	• Long-term monitoring of groundwater quality and quantity in hydrogeologic areas of interest through the PGMN • Inventory and mapping of karst areas as part of NPCA hazard mapping (Slaine 2006)

- The NPCA Water Quality Monitoring Program continues to provide technical support to other NPCA programs, including Restoration, Regulation, and Source Water Protection.
- Most of the recommendations made in the NPCA Groundwater Study (WHI 2005) have been fulfilled through various NPCA initiatives.

8.0 RECOMMENDATIONS

Based on the surface water quality monitoring data collected to date, upper Twelve Mile Creek represents the best water quality conditions in the NPCA watershed. Nutrient inputs from surrounding urban, rural and agricultural landuse continue to be a source of water quality degradation in the NPCA watershed. As such, it is recommended that surface and groundwater monitoring be continued in order to track changes in water quality over time throughout the watershed, target restoration activities, provide information for other NPCA programs, and assist in the development of source water protection plans.
Recommendations from the NPCA Water Quality Monitoring Program 2009 Annual Report are summarized as follows:

- Key water quality sampling stations established during the preparation of Watershed Plans should be integrated into the permanent water quality monitoring network. Currently, monitoring at many of these stations is discontinued with the completion of a Watershed Plan resulting in significant discontinuities in the data.
- Additional monitoring stations should be implemented in the vicinity of urban areas to better assess the impacts of municipal runoff (i.e. stormwater outfalls, combined sewer overflows) on the ecology of the watershed.
- Develop and implement a pilot septic system inspection program in partnership with the Region of Niagara Public Health Department. It is evident that aging and faulty septic systems contribute to poor water quality by discharging partly or untreated effluent into subsurface and surface drainage pathways. The persistently elevated concentrations of nutrients and bacteria in the Welland River between the Binbrook Reservoir and the City of Welland makes a sub basin in this reach an ideal location for a pilot program.
- Increase the base budget allocation for the Water Quality Monitoring Program to allow for the implementation of the previous three recommendations listed above.
- Continue to implement watershed restoration projects with an emphasis on nutrient management, riparian buffers and increased forest cover. Watersheds with a combination of persistent nutrient exceedances and high stream sediment loading should be targeted. For example, observations by both the NPCA and the agricultural community indicate that the upper reaches of Twenty Mile Creek, Fifteen Mile Creek, and tributaries of the Welland River (i.e. Big Forks Creeks, etc.) are candidates for restoration efforts.
- Continue to implement the recommendations outlined in the Groundwater Management Strategy of the NPCA Groundwater Study (WHI 2005). The Groundwater Management Strategy recommends several actions to assist in protecting groundwater quantity and quality, with a special emphasis on hydrogeologically sensitive areas where this is a high potential for groundwater contamination.
- Continue to promote the NPCA Water Well Decommissioning Program in order to reduce the risk of groundwater contamination and improve local water well awareness.

- Continue to work in partnership with Hamilton International Airport and the City of Hamilton Glanbrook Landfill to monitor water quality.
- Continue to foster and expand partnerships with other agencies to strengthen support for water quality monitoring initiatives in the NPCA watershed. This includes representation through community outreach and education projects such as the Niagara Children's Water Festival and broader initiatives such as the Niagara Water Strategy (Region of Niagara 2003).
- Continue to investigate PGMN water quality exceedances with respect to public health protection.

9.0 REFERENCES

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10.0 ACKNOWLEDGEMENTS

The NPCA would like to thank the City of Hamilton, Ontario Ministry of the Environment, and Regional Municipality of Niagara for their on-going support of the NPCA Water Quality Monitoring Program.

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **The Chairman and Members of the Authority**

DATE: **May 19, 2010**

SUBJECT: **Niagara River Remedial Action Plan - Stage 2 Update – Report No. 26-10**

In 2009, the RAP focus was largely on determination of the validity of the original beneficial use impairments (BUIs) identified in the 1995 RAP Report. The status of the impairments was essential, in order to complete the Stage 2 Update Report , as a precursor to the action necessary to pursue delisting. Those BUIs being considered for redesignation to "Not Impaired" include: Restrictions on Wildlife Consumption, Fish Tumors, and Bird or other Animal Deformities & Reproduction Problems.
The Stage II RAP Update Report has now been completed and attached for the Boards information please find a brief Stage II Update Fact Sheet which is intended for the general public. The full Stage II Report can be accessed online, for anyone interesting in learning more

RECOMMENDATION:

That: Report No. 26-10 be received.

Prepared by: John Kukalis, Director, Water Management

Respectfully Submitted By: _____
Tony D'Amario, CAO/Secretary-Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **The Chairman and Members of the Authority**

DATE: **May 13, 2010**

SUBJECT: **Terms of Employment and Personnel Regulations - Report No. 27-10**

Attached for consideration of the Board is a revised NPCA Terms of Employment and Personnel Regulations. A number of housekeeping changes were required as well as recommendations for revisions that clarify NPCA policies. Below is a summary of the significant changes.

- The term, General Manager has been replaced by Chief Administrative Officer throughout the document.

- Page 7 – Retirement clause as per the new Federal Policies

- Page 8 – Hiring practices have included who would terminate employees as well.

- Page 17 – Overtime – In an effort to deal with excessive overtime accumulations, the policies have been revised to emphasize overtime amounts beyond the policy will not be allowed unless there are specific reasons as approved by the CAO.

- Page 18 – No overtime for senior staff Grades 9 – 11 (currently the Directors and CAO). 1 additional week in lieu is credited. Shown previously as 5 days.

- Page 19 – The NPCA previous policy had Remembrance Day listed as a designated holiday however since many offices were open that day, a 1 Floater Day was approved as the alternative. NPCA offices since that time are now open and staff can take that day or any other day in lieu. This was previously approved by the Board at that time and I have not recommended any revisions to this policy at this time.

- Page 21 – Vacation Credits – In order to prevent the accumulation of excessive vacation credits this section has been revised to enforce the policy to require employees to take their vacation during the period in which they were earned. If not, the policy allows their supervisor to schedule vacation for them. This is allowable under the Employment Standards Act according to advice from the NPCA solicitor.

- Page 32 – I have not approved an increase in mileage rates for some time and our current rate is less than the Region's. This is to discourage staff use of their own vehicle to only when necessary. I recommend a change to this policy to NOT follow Niagara Region mileage rates.

- Page 34 – Safety Boot allowance increased as revised in the previously

approved Health and Safety Policy

RECOMMENDATION:

That the revised Terms of Employment and Personnel Regulations be approved.

Respectfully Submitted By: _____

Tony D'Amario, P. Eng. CAO/ Secretary-Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **The Chairman and Members of the Authority**

DATE: **May 5, 2010**

SUBJECT: **NPCA Wetland Policy Report; Report No. 28-10**

This report follows up on to discussion at the April, 2010 Board meeting with respect to NPCA's regulation of wetlands. Specifically, questions were raised with respect to how restrictive NPCA's Wetland regulation is relative to other jurisdictions and NPCA's process that seems at times to request studies that are unnecessary.

From inception until the mid 1990's CA's Water Management Programs were focused primarily on flood and erosion control. Around the same time, the Province was withdrawing funding/support for CA programs and in 1998, the Conservation Authorities Act was amended as part of the Red Tape Reduction Act (Bill 25), to be more complementary to Provincial Policy Statements. These revisions ultimately resulted in the creation of a Generic Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation, which was approved by the Province on May 1, 2004.

In order to ensure that implementation of the new regulation was relevant to local needs, the NPCA held multiple municipal and public consultation sessions throughout 2005 prior to finalizing Ontario Regulation 155/06. Ultimately the regulation came into effect on May 4, 2006.

Currently all 36 CA's have regulations based on the generic regulation which includes provisions for regulation of both Provincial Significant Wetlands (PSW) and Locally Significant Wetlands (LSW). Most regulations impose development buffers or setbacks from wetlands of between 30 to 120 meters, as required by the Province. The administrative and implementation guidelines of each Authority vary significantly due to local conditions and resulting individual CA policies which are used to implement the regulation. Attachment No 1 provides a comparison of wetland related applications that would be granted approval based on adopted policies of each CA.

The NPCA's Board adopted policies to implement the regulation are laid out in detail in our Policies, Procedures and Guidelines for the Administration of Ontario Regulation 155/06 and Land Use Planning Policy Document, December 12, 2007. In this regard, after comparing the regulations/policies of other jurisdictions, the following observations are made:

i) NPCA's guidelines are very clear on what the requirements are for proponents contemplating works is areas that are regulated;

ii) NPCA's policies are relatively permissive, with minimal wetland setbacks, numerous exceptions in setback restrictions for existing occupants/operations, no meander belt allowances in valleys and no floodplain offsets;

iii) iii) NPCA's policies address and provide significant exemptions from EIS requirements for minor works, such as decks, additions, etc;

iv) NPCA policies allow for reconfiguration of LSW boundaries.

As confirmed by the attachment, the NPCA policies overall are significantly more flexible and less onerous on applicants that in other neighboring jurisdictions. This was a result of both Board Members and CA staff recognizing the unique economic, agricultural and social challenges in the Niagara Peninsula. The adopted policies reflected an approach which balanced these needs with the intent of the environmental legislation and policies.

In addition to responsibilities pursuant to the Regulation, the NPCA has also been delivering natural resource related review functions on behalf of other agencies, as per the intent of the Red Tape Reduction Act. This allows local municipalities and landowners to have a true "one window" process for natural hazard and natural heritage issues. The current services that the NPCA delivers on behalf of other agencies are:

- Development review related to Natural Hazards in the Provincial Policy Statement (delegated from MNR for Niagara, Hamilton and Haldimand)
- Administration (level II) of Fisheries Act (delegated from DFO)
- Development review related to Environmental Policies in the Regional Policy Plan (delegated from RMON)
- Development review related to Natural Heritage section of the Provincial Policy Statement (delegated from RMON, Hamilton and Haldimand)
- Administration of the Region of Niagara's Tree and Forest Conservation Bylaw (delegated from RMON)
- Technical review of Environmental Impact Studies for Local Municipalities in Niagara

All of our responsibilities related to the above are set out in memorandums of understanding.

Although the "one widow approach" is advantageous for proponents, this arrangement does produce situations where NPCA staff is obligated to request an EIS be submitted even when they feel it may not be necessary. This is because in context of other agency requirements, NPCA's role is limited to that of advisor, translator and reviewer. Authority staff do not have authority to waive a requirement under another agency's mandate. A specific example of this would be a garage addition in an existing built up area adjacent to a wetland. Under NPCA's policies, staff have discretion to waive an EIS requirement, but if the area was also captured by Regional Environmental Core Natural Heritage Policies, an EIS would automatically be needed. As NPCA is "on the ground", the distinction between review agent and approval authority is often unclear to proponents.

Currently, the NPCA and municipalities are undertaking a review of the Memorandum of Understanding that governs our involvement in Natural Heritage/Environmental Plan Review beyond our Regulation. One of the key issues to be resolved is how to proceed when NPCA expert staff (i.e. Biologist) deems that an EIS, although flagged, is not required.

NPCA's wetland Planning Policies around Provincially Significant Wetlands (PSW), have meet with some resistance from the development community, albeit they are consistent with the higher tier documents like the Provincial Policy Statement (PPS) which is clear in that development shall be directed away from PSW's. While NPCA policies do have significant exemptions for existing development (i.e. dwellings, agricultural operations) and public utilities that cannot be located elsewhere; new subdivision, industrial and commercial development within 120 meters of PSW's are required to undertake an EIS. This can result in a need to modify their proposals, so that negative impacts to the PSW are minimized. Furthermore, if supported by an EIS the minimum setback can be reduced to 30 meters, but intrusion beyond that and/or relocation of a PSW is not permitted. Given the PPS with respect to wetlands, requirements for EIS and setbacks from PSW's should not be unexpected by local municipal planning departments, as pursuant to the Planning Act, municipalities are also required to make decisions that are consistent with the PPS.

It should be noted that when the province first drafted the PPS and generic Regulation, the extent of wetlands was not reliably known, nor was their general understanding in the consulting industry on how to classify a wetland. Since 2008, both issues have been clarified. The Ontario Municipal Board has confirmed that the Ontario Wetland Evaluation System (OWES) is now the industry accepted standard for wetland classification. Furthermore, the recent completion of the Natural Areas Inventory Project (NAI) and Large Scale Base Mapping has allowed NPCA to confirm wetland boundaries, with far more accuracy than in many jurisdictions. While the constraints associated with PSW's are arguably no more strict in Niagara, the impact of wetland regulation is more pronounced. With reference too Attachment No 2, it can be seen that Niagara has by a good margin, more identified PSW's than any of the other CA's that abut our jurisdiction. The extent of wetlands in Niagara has inevitably led to conflicts with existing plans of subdivision and municipal economic development schemes.

The final point that should also be clarified is that NPCA has no authority to set or modify boundaries of PSW's. NPCA staff can field verify the extent of a wetland, however any significant variation in boundary from map to ground or any request for wetland reclassification, must be approved by the Ministry of Natural Resources. NPCA has no power to establish wetland boundaries and are limited to confirming their location and enforcing their protection.

On a go forward basis, staff believe some minor amendments to the current Policies, Procedures and Guidelines for the Administration of Ontario Regulation 155/06 and Land Use Planning Policy Document are warranted, in particular as they relates to municipal infrastructure and drainage projects. Most important is the need to address the provisions of flexibility to waive certain requirements when providing review services for other agencies, as discussed above. The larger issue of how the PPS regarding wetlands impacts municipal development is beyond the control of the NPCA.

Attachments:

- Attachment 1 - Comparison Table of Wetland Approvals
- Attachment 2 - Comparison Table of Wetland Coverage
- Attachment 3 - Overview Map, Wetlands in Niagara

RECOMMENDATION:

That Report No. 28-10 be received for information;

Prepared by: John Kukalis, Director, Water Management

Respectfully Submitted by:_____
Tony D'Amario, P.Eng. CAO/Secretary-Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **The Chairman and Members of the Authority**

DATE: **May 11, 2010**

SUBJECT: **DSBN Proposal – Woodend Conservation Area – Report No. 29-10**

Background

The District School Board of Niagara leases a 3 acre parcel of land from the NPCA at Woodend Conservation Area. The property is used for the Woodend Outdoor Education Centre, offering programs for students from kindergarten to Grade 12. The leased property includes three buildings (main house, gate house and garage) and a trail system, linking to Conservation Area trails and the Bruce Trail. A map of the area has been attached to this report for reference.

NPCA has been leasing the land to the School Board since 1991. Under the terms of this lease, the School Board is responsible for the upkeep of the buildings, restoration of the main house and maintenance of the leased property. Conservation Authority staff assist with tree trimming and other specialized trail work. The Conservation Authority is also responsible for maintenance and upkeep of the road leading to the Centre.

Discussion

At the April 21st meeting of the Full Authority, representatives from the DSBN presented a proposal for the re-development of facilities at Woodend Outdoor Centre. The proposal involves demolishing the garage and the gatehouse, then constructing new buildings to provide modern, comfortable facilities for students and staff.

The garage is currently being used as a classroom. The building is poorly insulated, it is heated by a wood stove and is not an ideal environment for teaching, especially in cold winter or hot summer months. The DSBN proposal would demolish the garage and replace it with a new, modern building with two classroom spaces and washroom facilities. The building would occupy the same footprint as the existing garage.

The Gate House is currently used as the administrative office for the Education Centre. DSBN is proposing to demolish this building and replace it with a two-story structure combining office space, meeting rooms and storage areas for programming material. This would also be located on the same footprint as the existing gatehouse.

Staff have reviewed the proposal and offer the following information for consideration:

Master Plan

The Conservation Area Master Plan provides a long-range vision for the site. The current Master Plan for Woodend was prepared in 1981, when the NPCA operated an outdoor education facility at this site. Outdoor education is one of the primary focuses of the plan. The DSBN proposal is in keeping with the master plan.

Niagara Escarpment Plan

Woodend is a Natural Environment park in the Niagara Escarpment Parks and Open Space System. As such, it is subject to the requirements under Part 3 of the Niagara Escarpment Plan. While outdoor education is supported by the NE Plan, the changes proposed by the DSBN are fairly significant and will require Development Permits from the NEC.

Servicing

The Woodend Outdoor Education Centre relies on a cistern, with water trucked into the site on a regular basis. Given the distance to municipal water service, it is not likely that municipal piped water will be available. As such, any future development will be restricted by the capacity of the cistern.

The sewage system at Woodend is very old and would not meet the current standards. Given the proposed use, and the shallow bedrock in this location, it is likely that a new sewage system will be required. The level of use may also bump this facility up to the jurisdiction of the Ministry of the Environment. A certificate of approval may be required for any expansion of the existing sewage facility. Additional work will be required to determine the volumes and use at the new facility.

If a certificate of approval is required, it may provide an opportunity for the NPCA to partner with the DSBN for the construction of a separate washroom facility that would service both students and Conservation Area visitors.

Municipal Building Permits

The DSBN will require building permits from the Town of Niagara-on-the-Lake. As property owners, the NPCA will be required to play a role in the application for permits, however all of the details, plans and fees will be the responsibility of the DSBN.

The proposed use may also result in a requirement for upgrades to the access road. The existing road meets the requirements for emergency vehicle access, based on the current use of the facility. Should upgrades be required, staff recommend that the School Board be responsible for the upgrades as well as long term maintenance.

Architectural History

Staff have not been able to determine the exact date of the gatehouse house. As such, we cannot rule out that the structure may have significant architectural or historical attributes. More research is required to ensure that valuable resources will not be lost if the gate house building is removed.

Summary

The DSBN proposal is in keeping with the goals and objectives of the Woodend Conservation Area. It would improve the existing facility, allowing the board to expand outdoor education opportunities. There may also be benefits to the NPCA if park infrastructure can be upgraded for our Conservation Area visitors. Conservation Authority staff will continue to work with our counter-parts at the School Board as the plans are refined.

This project is in the very early stages, and much more work will be required before any construction can begin. The DSBN is aware of the many approvals required and the various agencies they will be

dealing with throughout the course of this project. The School Board will be responsible for developing plans and obtaining approvals for the project. Authority staff will assist wherever possible.

Although the work will be restricted to the leased area and existing building sites, Authority staff recommend that an environmental impact study be conducted in the very early stages of the project to ensure that the proposed changes do not have any negative impacts on the natural attributes of the site.

RECOMMENDATION:

That Report No. 29-10 be received;

That the District School Board of Niagara proposal for Woodend Outdoor Education Centre be approved in principle; and,

That the School Board be requested to complete an environmental impact study for the project, to be submitted with detailed plans for the development, prior to receiving final approval by the Niagara Peninsula Conservation Authority.

Prepared by: Darcy B. Baker - Director, Land Management

Respectfully Submitted By: _____

Tony D'Amario, CAO/ Secretary-Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **The Chairman and Members of the Authority**

DATE: **May 11, 2010**

SUBJECT: **Regional Tree and Forest Conservation By-Law – Report No. 30-10**

On April 10th, 2008 the Region of Niagara approved a service level agreement for the transfer of implementation of the Tree and Forest Conservation By-law enforcement to the Niagara Peninsula Conservation Authority. The agreement was the result of 16 months of discussion and negotiations with the Region, and other jurisdictions that have tree by-laws in place. During the process, two staff reports were brought to the board along with several verbal updates by the General Manager.

The transition to the NPCA was first proposed by Regional Staff in 2006. At that time the by-law was being implemented by Regional Planning Staff, with assistance from a By-law Advisory Committee and forestry consultants. After several meetings at the Commissioner level, it was recommended that NPCA staff speak with the individuals responsible for implementing the program. There were two planners actively involved in the drafting and implementation of the by-law. They suggested that, on average, the task required two staff people to implement. This was a sharp contrast to the Regional Planning Department information indicating that the by-law only required 1 staff person.

Authority staff consulted with other jurisdictions to find out how they were implementing their by-laws. We found that other by-law staff had forestry backgrounds, rather than planning experience. This allowed for faster service, kept forestry consulting costs down and provided greater opportunities for public education. Based on all the information collected, the NPCA worked out a proposal to assume responsibility for the By-law, and submitted it to the Region of Niagara, along with a proposed budget. The $222,000 budget included two staff people with forestry expertise, travel costs, equipment, educational materials and legal support.

The Regional Management Team was concerned that the report suggested two people. Authority staff reconsidered the proposal and confirmed that the new by-law involved 24-hour, 7 days per week response capability for complaints and corresponding inspections. In addition, the additional program activities that could be accomplished with the proposed staff resources includes woodland inspections, public education, promotion and a permit method that relies on Good Forestry Practices. It was concluded that on this basis, proper implementation of the program could only be achieved with two experienced staff. This position was confirmed by the Full Authority and the matter re-submitted to the Region for consideration and was approved.

The actual transition took effect on August 1st, 2008. Since that time, the by-law staff have been responsible for many public education initiatives, presented the by-law to local municipalities and enacted a 24-7 response program for complaint calls. Staff are able to provide rapid turn-around for forestry related questions and have become a resource for many municipalities and private landowners in the Region of Niagara.

Overall, since the transfer of the responsibilities to the NPCA, the program has received many positive responses over timely administration of the by-law, professionalism of implementing staff and the educational components of the program.

It is important to also note that during deliberations relating to accepting a program to administer the by-law, the NPCA staff and Board members believed it important that new initiatives accepted by the NPCA should be sufficiently financed so as to not require limited NPCA resources that are needed for other existing programs. This same principle was applied when the NPCA accepted the Source Protection Planning Program (100% funded by the Province), the Remedial Action Program (100% funded by the Province and Federal Government) as well as the Planning MOU with Niagara Region (required staff resources added to the NPCA base budget).

RECOMMENDATION:

That Report No. 30-10 be received for information:

Prepared by: Darcy B. Baker - Director, Land Management

Respectfully Submitted By: _____

Tony D'Amario, CAO/ Secretary-Treasurer

TO: **The Chairman and Members of the Authority**

DATE: **May 11, 2010**

SUBJECT: **Conservation Area Directional Signage – Report No. 31-10**

Background

In 1997, the Province of Ontario signed an agreement with Canadian Tourism Orientation Directional Signage (TODS), to provide tourism directional signs on the Provincial Highway System. Prior to the TODS agreement, the Ministry of Transportation was responsible for tourism signage. Local and Regional road networks stayed under the jurisdiction of the respective municipalities.

The current system of NPCA Conservation Area directional signs are a combination of Provincial, Regional and local signage. In 1997, all highway signs were changed to reflect a new blue and white format, however the Regional signs in Hamilton and Niagara followed the old MTO standard. Local municipal signs reflect the logo and design from the era in which they were installed. The end result is a system that is confusing to the travelling public.

Discussion

Two years ago, the NPCA embarked on a project to update all the directional signage for our Conservation Areas. Working with TODS, the Region of Niagara, City of Hamilton and all of our local municipalities, staff inventoried existing directional signs and documented their condition. The vast majority of signs are in suitable locations, however two Conservation Areas (Ball's Falls and Binbrook), require additional signage, augmenting the system and better reflecting current transportation routes and urban development. For example, Regional Road 81 (Old Highway #8) is not considered a major transportation route like it was back in the 1970s. Directional signs to Ball's Falls are based off Regional Road 81, rather than Victoria Avenue, which is currently the main route for traffic to Ball's Falls. As a result, there is very poor continuity along Victoria Avenue, between the Queen Elizabeth Way and the Conservation Area.

Region of Niagara

There are more than 35 signs along Regional Roads in Niagara. They are all various sizes, shapes, colours, and conditions. Most of these signs are in suitable locations, however additional signs are required to complete the route along Victoria Avenue and Jordan Road, between the QEW and Ball's Falls.

Staff from the Region and the Conservation Authority have completed a review of the sign system and developed a strategy to replace and augment existing routes. The Region recently adopted the TODS blue and white directional signage which will help standardize directions for the travelling public. Over the next several months, the Niagara Region Public Works Department will be replacing existing signage with new signs. Sign costs vary from $250 to $400 each, and will be covered by the Conservation Authority, through the approved 2010 budget. Regional staff estimate that all Conservation Area signs will be updated by the end of this year.

City of Hamilton

Binbrook Conservation Area is the only site in Hamilton with directional signage. At present, there is one older MTO sign on Regional Road 56, and several municipal signs along the roads surrounding the Conservation Area. Staff have been attempting to develop a strategy for new directional signage to Binbrook, however the City of Hamilton has been struggling with their sign program. Responsibility for directional signage was recently transferred to Tourism Hamilton. The City has adopted the TODS format, however, unlike TODS, the City of Hamilton is only prepared to sign one route to a destination. Under previous programs there were four routes signed to the Binbrook Conservation Area.

The current NPCA proposal is to request signage from Mud Street/Lincoln Alexander Parkway, south along Highway 20, Regional Road 56 to Kirk Road. This route should work for visitors from Hamilton's East Mountain, Stoney Creek and Binbrook. Unfortunately, the City of Hamilton will not support signage along additional routes from the East, West or the South. With the Board's support, Authority staff will continue to request multiple routes into Binbrook Conservation Area, with a goal to have signage in place before the end of 2010.

Haldimand County

Although there is no directional signage to Conservation Areas in Haldimand County, there are signing opportunities off Highway #3 for Binbrook and Long Beach. Since this is a Provincial Highway, any sign requests will be handled by Canadian TODS.

RECOMMENDATION:

That Report No. 31-10 be received for information; and,

That staff submit a formal request on behalf of the Full Authority to Tourism Hamilton for the establishment of multiple tourism directional routes into the Binbrook Conservation Area.

Prepared by: Darcy B. Baker - Director, Land Management

Respectfully Submitted By: _____

Tony D'Amario, CAO/ Secretary-Treasurer

TO: **The Chairman and Members of the Authority**

DATE: **May 11, 2010**

SUBJECT: **Appointment of Enforcement Officers – Report No. 32-10**

Staff in the Land Management section of the Niagara Peninsula Conservation Authority are responsible for enforcing Conservation Area rules and regulations made under Section 29 of the Conservation Authorities Act. Currently, a number of staff in our Conservation Areas are designated as NPCA Enforcement Officers appointed by the Board to under Section 28 of the Conservation Authorities Act of Ontario. In early May, two staff were hired to fill recently vacated positions. These individuals are in important positions that are responsible for the enforcement program in our campgrounds.

Based on the above, it is recommended that Mr. Greg Furtney, Assistant Superintendent of Long Beach Conservation Area and Mr. Bob Hayslip, Assistant Superintendent of Chippawa Creek Conservation Area be appointed as Enforcement Officers under Section 29 of the Conservation Authorities Act of Ontario for the term of their employment with the Conservation Authority, as specified under Section 28 (1)(d) of said Act.

RECOMMENDATIONS:

That Mr. Greg Furtney and Mr. Bob Hayslip be appointed as Enforcement Officers under The Conservation Authorities Act.

Prepared by: Darcy B. Baker - Director, Land Management

Respectfully Submitted By: _____

Tony D'Amario, CAO/ Secretary-Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

TO: **Chairman and Members of the Authority**

DATE: **May 17, 2010**

RE: **PROJECT STATUS REPORT - REPORT NO. -10**

WATER MANAGEMENT

I. Watershed Regulation Division

1) Binbrook Reservoir & Gauge Stations

Staff continue to monitor the water levels at the Binbrook reservoir on a regular basis and adjust the valve settings as required based on forecast weather. Staff also continue to monitor the water levels at our 13 gauge stations on a daily basis as part of the NPCA's routine flood forecasting/warning duties. The public is able to access this real-time information through our website.

2) NPCA 'Regulation of Development, Interference with Wetlands, and Alteration to Shorelines and Watercourses'

i) Permits

The NPCA has approved 24 permit applications for the 2010 calendar year pursuant to the NPCA's 'Regulation of Development, Interference with Wetlands, and Alteration to Shorelines and Watercourses' regulation (Ontario Regulation 155/06).

ii) Violations

Please refer to the associated Report under "in camera" section of agenda.

iii) NPCA-DFO Partnership Agreement

The NPCA is under agreement with the Department of Fisheries and Oceans (DFO) to review works in or near water to determine whether the work is likely to result in the harmful alteration, disruption or destruction of fish habitat (HADD). As part of the NPCA-DFO Partnership Agreement, NPCA staff work as a liaison between DFO Assessors and proponents to recommend appropriate fish habitat compensation projects. During the current calendar year NPCA staff has reviewed 21 applications under this agreement.

iv) Municipal Drain Maintenance Review

The NPCA continues to represent Conservation Authorities located in Central Ontario. on the DART Committee with representatives of the Ontario Federation of Agriculture, Drainage Superintendents Association of Ontario, Ontario Society of Professional Engineers(Land Drainage Committee), Association of Municipalities of Ontario – Rural Caucus, OMAFRA, MNR

and Conservation Ontario. The purpose of the DART is to develop a consistent approach and technical direction with regard to municipal drainage project review under Conservation Authority Regulations. NPCA staff has reviewed 7 municipal drain projects during the current calendar year.

3) Floodplain Mapping

i) Bearss Drain – City of Port Colborne
The NPCA is presently undertaking the necessary calculations, field work, and map analysis to accurately determine the extent of the 100 year flood elevations for the Bearss Drain located in the City of Port Colborne.

ii) Eagle Marsh Drain – City of Port Colborne
The NPCA is presently undertaking the necessary calculations, field work, and map analysis to accurately determine the extent of the 100 year flood elevations for the Eagle Marsh Drain located in the City of Port Colborne.

iii) Wignall Drain – City of Port Colborne
The NPCA is presently undertaking the necessary calculations, field work, and map analysis to accurately determine the extent of the 100 year flood elevations for the Wignall Drain located in the City of Port Colborne.

II. Watershed Planning Division

1) Municipal and Development Plan Input and Review
Although new site plan and subdivision submissions are lower than anticipated, plan review activity has remained brisk, with the majority of work involving either existing files of record or smaller private dwelling proposals. This is directly attributed to the Authority's expanded mandate related to protection of wetlands.

Staff continue to spend a considerable amount of time reviewing updated municipal official plans. Municipalities are working towards a June 2010 Provincial deadline for updating their official plans to reflect Places to Grow legislation.

Work continues on updating the Niagara Memorandum of Understanding (MOU) for Planning.

2) Watershed Plan Preparation

a) Lake Erie North Shore Watershed Plan
A final Steering Committee meeting was held on April 27th to review the Watershed Plan and address any questions or concerns the Steering Committee members may have about the Final Document. Edits to the Draft Lake Erie North Shore Watershed Plan are well underway to reflect the comments received from staff, Steering Committee members, and watershed stakeholders.

A public open house was held on May 4th at the Roselawn Centre in Port Colborne. The purpose of this open house was to present the Watershed Plan to the public and receive any feedback they may have before presenting the document to the NPCA Board of Directors. Cogeco was in attendance and conducted an interview regarding the Watershed Plan that was

aired on the local television network. Overall the open house was a positive experience with alot of excellent dialogue from members of the public.

A copy of the DRAFT Lake Erie North Shore Watershed Plan has been posted on the NPCA website and been placed in Port Colborne and Wainfleet libraries with a small display map of the study area and a copy of the document for public commenting until May 31, 2010.

b) Central Welland River Watershed Plan
Work on the Restoration Strategy has been temporarily suspended until the completion of several studies that will be incorporated into the Watershed Plan. Work on this Watershed Plan will resume later this year.

Erosion pins were re-assessed at 2 of the 4 sites in the study area; Beiderman Drain at Wainfleet bog had 2 sets of 5 pins assessed (10 all together) and Beiderman Drain at Mud lake had ten pins assessed. Collected data has been entered into the database.

c) Beaverdams and Shriners Creek Watershed Plan
Work on this Watershed Plan has been temporarily suspended to focus on completing the Lake Erie North Shore Watershed Plan and the initiation of the Lower Welland River Characterization Terms of Reference. Work on this Watershed Plan will resume later this year.

Erosion pins were re-assessed at one site in the study area; two sets of 5 pins and the data has been entered in the database.

Letters have been sent to approximately 100 properties in this study area requesting permission to enter private property in order to access the watercourse to conduct field work for the NPCA Fluvial Geomorpholgy Study. 17 confirmations have been received to date. Field work is expected to begin in June.

d) Upper Welland River Watershed Plan
The Final Phase One: Watershed Characterization and Issues Identification Report is complete and has been posted on the NPCA website.

A public workshop was held on April 29th from 7 to 9 pm at Caistor Community Centre in Abingdon. The purpose of the workshop was to give the public an opportunity to identify any issues and concerns they may have about the study area and their objectives for the Watershed Plan. Approximately 10 people were in attendance and dialogue amongst the group was excellent. Overall the workshop was a positive experience.

d) Lower Welland River Watershed Plan
A Draft Terms of Reference for this study area has been completed and submitted to senior staff for review.

Landowner contact for Thompson Creek to request permission to enter private property in order to access the watercourse to conduct field work for the NPCA Fluvial Geomorpholgy is awaiting mailing addresses from MPAC: a total of 21 properties in study area of which 1/3 is owned by Cytec.

3) Natural Areas Inventory/Heritage System

The Project Management Team has also been busy compiling information for preparing the draft Terms of Reference for the functioning of both the Technical and Steering Committees for the Natural Heritage Systems Project.

Staff met with the provincial MNR team that developed the pilot project for a Natural Heritage System in Niagara. This helped to answer questions about the logistics of the work plan and technology transfer. Staff also attended a Scenario Development Team meeting of the Hamilton NHS. This was instrumental in clarifying the process for our team.

Staff are planning an internal Management Team meeting to discuss the draft workplan and timeline.

III. Source Water Protection Division

1) Source Water Protection Plan

A Source Protection Committee (SPC) meeting was held on April 27, 2010, to review public and unofficial MOE comments on the Assessment Report (AR). Source Protection staff have been busy making the revisions to the AR to address the comments received. The next consultation period is expected to cover 30 days in late May and June. The proposed AR will be presented to the Source Protection Authority in June 2010.

SP staff met with the St. Lawrence Seaway Authority on May 7, 2010 to update the Seaway Authority on the Source Protection process and obtain more information on the Welland Canal in the areas of the municipal water intakes.

2) Water Quality Monitoring Program:

a) Routine Water Quality Work

- Routine surface water quality monitoring continues at all NPCA stations until November 2010.
- The NPCA continues to collect groundwater level data at 15 monitoring wells as part of the Provincial Groundwater Monitoring Network (PGMN). Spring samples have been collected from 12 of 15 PGMN wells. There are no new exceedances of health-related parameters to report at this time.
- The 2009 annual water quality report has been completed and submitted to the Board for review.
- NPCA staff have submitted the final report to Hamilton International Airport for the 2009 annual biomonitoring assessment, and have completed the spring sampling for the 2010 airport water quality assessment.
- NPCA staff will be completing the spring water quality assessment for the City of Hamilton's Glanbrook Landfill this month, as per the bi-ennial monitoring agreement.

b) Special Water Quality Projects

- the Welland River Eutrophication Study is currently underway. Weekly sampling and flow monitoring has begun at three problem tributaries identified by the Technical Working Group: Beaver Creek, Big Forks Creek, and Oswego Creek. Dissolved oxygen sensors will also be deployed at 6 locations in 2010 which include the three tributaries listed above. Monthly chlorophyll-a sampling will also resume in 2010 at all Welland River watershed

stations.
- the NPCA is working in partnership with the Region of Niagara and the Canadian Centre for Inland Waters in a study to determine the sources of *E. coli* at beaches located along Lake Ontario and Lake Erie. NPCA monitoring stations located on watercourses draining to beaches of interest will be tested as part of this study.
-The NPCA continues to receive requests for applications for the NPCA Water Well Decommissioning Grant Program.

IV. Geographic Information Systems (GIS) Division

1) Source Water Protection Support Activities

- Staff have rerun the managed land calculations and made some revisions to the cartography for the DRAFT Assessment Report (AR) as per MOE comments from the public consultation process.
- Staff has completed testing the DRAFT logical data model for the water quantity component (water budget) of the Assessment Report Database (ARDB) as a pilot project for MNR.
- Staff has uploaded the most current Source Protection Area, Water Systems, and Vulnerability components of the ARDB to CAMaps.ca for delivery to MOE as per their request for use in identifying stewardship funding opportunities with the OSCIA.
- Staff has forward the preliminary threats data for the DRAFT AR to the MOE and MNR for use in the project that will define the data structure for the Threats component of the ARDB.

2) Watershed Planning Support Activities

- The final QA/QC pass of the Community Series ELC mapping is nearing completion in Pelham. Thorold and West Lincoln are next based on the final wetland evaluations which were received earlier this month. Haldimand and Fort Erie need the full QA/QC pass yet as well. Hamilton also needs to be captured, which will integrate existing ELC mapping from the Hamilton Nature Counts NAI (have detailed ELC for their ESAs).
- Site specific ELC Vegetation Type mapping, based on the data collected in the field has been completed for approximately 75% of the sites visited.
- The additions and refinements to our Section 28 Hazard Inventories and updated screening and Niagara Natural Environment Information layers have been circulated to the Niagara Area planning authorities via the NPCA GIS FTP server.
- Capture of the toe of slope features for the riverine erosion hazard continues. These features will assist with calculating the predicted stable top of slope locations for unstable valley walls and will also facilitate the development of a large scale valleyland polygon layer.

3) Watershed Restoration Support Activities

- Mapping and data entry for the restoration projects and stewardship activities that have taken place over the last two field seasons by the Authority have been completed.

4) Corporate GIS and Information Management Support Activities

- Updates to the Niagara Atlas and development of the Niagara Navigator web mapping applications based on the new data structures implemented in our central data management environment are currently being worked on.

V. Watershed Restoration Division

1) Spring Project Implementation

- Staff are preparing for spring field season where the majority of effort will be on woodland restoration projects and riparian buffer plantings. In total 32 woodland restoration projects are being implemented across the watershed through partnerships with Landcare Niagara (funding provided through Trees Ontario Foundation and 50 Million Tree Program), Ontario Power Generation (bio-diversity and carbon sequestering funding) and the Niagara Restoration Council. Staff are currently coordinating plantings with contractors, volunteers and landowners.
- With program reductions, all Watershed Plan Implementation budgets are fully allocated for 2010 and we are in a waiting list situation. This presents a challenge for program promotion as landowners become frustrated to learn about project opportunities only to be told that funding is not available.

2) Watershed Plan Implementation Committees

- Watershed Implementation Committee meetings are scheduled for May 11th for NOTL Watershed Plan, and May 13 for the Twelve Mile Creek Watershed Plan. Fort Erie will be in early June. The Implementation Committee for 15,16,18 Mile Creek will be established this fall.

3) RAP Night of Good News

- The NPCA will be working with the Niagara Parks Commission to host a RAP event (a night of good news) around some of the recent RAP / partner accomplishments. Our partners have suggested a night during Environment Week (May30 -June5). Talks are underway with the NPC and we are hoping to have a room available at the Butterfly Conservatory.

4) ECO School Program

- Staff have approved the 2010 ECO School program participants. 23 applications were received, with 14 of these being first time applicants. Letters of approval will be sent out by the third week of March and site visits will begin at the end of April. Site prep will take place in May and planting in June.
- Program evolution – as the last year in the original five year program, staff are working with the Niagara Smart Program to evolve this program into a school yard tree planting initiative. Currently, there is very limited funding for the planting of large scale trees on school yards, however; the demand is high.

5) Yellow Fish Road

- A grant application to Trout Unlimited Canada / Shell Canada was successful in securing $2700.00 to further promote and enhance the delivery of the Yellow Fish Road program. Requests to participate from teachers and parents have already started coming in for the 2010 season.

6) Ducks Unlimited Partnership

- This year marks the 9th year of our Ducks Unlimited Partnership for increasing wetland in the Welland River / Niagara River Watersheds. Funding for this partnership is provided through a DU Trillium grant. Each year, DU invests $30,000 into Niagara wetlands. Staff are scoping project locations along the Welland River and Oswego Creek.

7) Community Fisheries Involvement Programs

- The Angler Diary Program continues to collect data from anglers in the Welland River and Twelve Mile Creek watersheds. 2010 Angler Diaries for both watersheds have been sent out to anglers that have returned their 2009 diaries. Additional Angler Diaries are in the process of being printed.
- Our 9th annual Angler Derby is being planned again for Saturday July 10th as part of Family Fishing Weekend. This year we will be hosting it with the City of Niagara Falls and the Welland River Keepers at George Bukator Park located on the Welland River near Chippawa. Our intent is to encourage new participation, obtain fisheries information from a different part of the Welland River and assist the WRK in expanding there membership.

8) Native Plant Workshop

- Plans are underway for our 2nd Native Plant Workshop. This year it will be a full day venue with the morning at the Balls Falls Centre for Conservation and the afternoon spent touring 3 restoration project sites including the E.C. brown wetland site. Tentative dates are mid-late July.

VI. Remedial Action Plan (RAP)

1) Lyons Creek East

The next Contaminated Sediments Technical Advisory Group (TAG) meeting date will be set upon receipt of all review comments on the Draft 2 Administrative Controls document. A newsletter for a public mailing will be compiled once all the review comments have been received. Next steps involve establishing a Management Framework Agreement between the stakeholders and the NPCA and a public communication strategy for Lyon's Creek East.

The Lyon's Creek East Sediment Transport Study (expected to be completed in July) and the Lyon's Creek East Long-Term Monitoring Plan will be on the agenda also at the next TAG meeting.

2) Stage 2 RAP Update
The Niagara River (Ontario) RAP Stage 2 Update report is now posted on the RAP page of the NPCA web site, and arrangements will be made to post it on the EBR site.

The RAP fact sheet – Update 2010 - is available (English and French) and is being distributed to AOC libraries and RAP partners, including to the U.S. Niagara River and Buffalo River RAPs.

The RAP Coordinating Committee met on April 20 to discuss the 2010/2011 RAP Work Plans, Monitoring Plans, Reporting and Communications Strategies, Roll-out of the Stage 2 Update report to stakeholders and workshops, etc. Plans are being made to seek support/commitments for the direction of the RAP towards delisting this AOC. A RAP public event is being planned for early June, as well as implementers' workshops later in the year. One of the workshops will provide a forum for project updates from the new RAP work plan (2010-2015) actions and an update on U.S. RAP initiatives.

3) Update: Canada-Ontario Agreement Respecting the Great Lakes Ecosystem (COA).
Since 1971, the Parties (Canada and Ontario) have worked together through a series of Canada-Ontario Agreements (COA) Respecting the Great Lakes Ecosystem that have guided their efforts to improve the environmental quality of the Basin and contributed to meeting Canada's obligations under the Canada-United States Great Lakes Water Quality Agreement (GLWQA). Originally, COAs were in effect for a 5-year term; however, due to the review and anticipated outcome of the Great Lakes Water Quality Agreement, the most recent COA (2007-2010) was for a 3-year term.

On March 31, it was announced that the COA will be extended for one more year. The Niagara River RAP is a priority under Annex 1 of the agreement.

4) International Liaison
- The next U.S. Remedial Advisory Committee (RAC) is expected to be held in May.

5) Update: Great Lakes Water Quality Agreement.
The current GLWQA is the revised Agreement of 1978 as amended by Protocol in 1987.

In 2006, the Bi-national Executive Committee initiated a review of the Agreement and its Annexes. The process included extensive stakeholder and public consultation efforts, culminating in the submission of a report to the governments of Canada and the United States in December 2008. Discussions are underway as to how negotiating talks will be handled, and the tentative date for completion is December 2010.

LAND MANAGEMENT

Ball's Falls Conservation Area

On April 18, the Bird Banding event with James Smith had 18 participants. This event was included in the price of day use admission. It was a great program and the people attending it were very interested in the bird banding.

The Earth Day event had 12 participants (registration required). The hike was the favourite part of the program. Participants were able to see American toads and Green Frogs in their natural environment.
"The Ribbet Exhibit Returns" is now on display in the temporary gallery until July 5.

In mid-May, staff conducted a tour for the 'International Biocontrol in the Americas Regional Sections Conference'. The tour highlighted the biological control techniques used by the Conservation Authority in addition to conservation measures associated with the LEED building

The 'Family of Skeletons Project' funded by 'TD Friends of the Environment Foundation' has provided the Conservation Authority with a variety of hands-on material for educational programming at Balls Falls.

On Saturday May 8, nine volunteers assisted staff with removal of 'Garlic Mustard' on the Twenty Valley Trail, near the Bailey Bridge. Plants were removed by hand and disposed properly to prevent further spread. Although further removal will be required, this activity provided an opportunity to educate the public about the impact of invasive plants in natural areas, and the benefits of choosing native plant material over non-native options.

The mezzanine level of the collections storage has been installed. This has dramatically increased the storage capability of this awkward space. The lower level installation should be complete by May 21st.

Recently our visitor log indicates that we have had visitors from Australia, Fergus, New Liskeard, Alliston, Mississauga, Woodstock, Buffalo, Orillia, Calgary(AB), Richmond Hill, Guelph, Ottawa, Pickering, Cheltenham, Holland, Corynna, Michigan, Oshawa, Surrey (UK), New York City, (NY), Lewiston, Clearwater (Florida), Stoney Creek, Walsingham, Sweden, Netherlands, Kitchener and Simcoe.

Visitors heard about us through: flyers, on-line, friend, by chance, brochure, Bear Display on-line (St. Catharines Standard site), OIA, friend, Bruce Trail Walks, Garden Club of Niagara, B & B Owners.

Two new memorial benches and trees have been added to the memorial forest at the Bert Miller Arboretum this spring.

New trail brochures have been designed for this year based on feedback received from visitors and park staff. New trail signs and map boards are in the works and expected to be installed later this year. Trail improvements being planned for this year include the upper falls area, and lower park area near the big barn and Ball home.

The NPCA received approval of our federal Canada Summer Jobs student employment application in the amount of $17,066, which will assist with hiring 4 interpretative positions; two staff at Ball's Falls and one staff each at Chippawa and Long Beach Conservation Area.

Binbrook Conservation Area

High water levels in late 2009 damaged the handicapped fishing platform. The existing platform is not safe and has been removed from public use. Staff are looking at alternatives to the former structure.

Work continues at the new pavilion and store. The pavilion already has 13 reservations for the summer. Renovations to the pump house and water treatment plant are now complete and docks have been re-installed at the boat launch ramp, ready for the summer season.

Binbrook welcomed Mike Boyko to the staff. Mike moved from Chippawa Creek to become the new lead hand for Binbrook Conservation Area.

Binbrook Conservation Area re-opened for the summer season on May 1st. The good weather resulted in higher than normal attendance. Most of the visitors were anglers, hoping to get some practice in before the big derby.

On Saturday, May 15th, Binbrook will play host to the Children's Introduction to Fishing Workshop, sponsored by the Canadian Bass Anglers Federation.

The Binbrook Crappie Derby will take place on Sunday, May 16th. The event will take place from 7:00 am to 1:00 pm. Gates open at 6:00 am. The cost to participate is $20 for adults and $5 for kids under 12.

Long Beach Conservation Area

Staff experienced difficulties with the sewage lagoon samples in late April. The uncommonly warm weather resulted in excessive algae growth, which exceeded acceptable guidelines for surface water discharge. Authority staff worked with the Region of Niagara and the Ministry of the Environment to treat and conduct further tests of the lagoons. On Wednesday, May 12th tests met the guidelines, and the lagoon began to discharge. Authority staff will be monitoring the discharge over the 4-day discharge period.

Greg Furtney was hired as the new Assistant Superintendent for Long Beach Conservation Area. He has been working with seasonal staff to get campground services and facilities ready for the May 21st season opening.

Chippawa Creek Conservation Area

Work on the new Wetland Biofilter sewage system is almost complete. Consultants are waiting for final review and approval by the Ministry of the Environment before the system can be activated. In the meantime, facilities are still tied into their existing septic systems.

Bob Hayslip has been hired as the new Assistant Superintendent for Chippawa Creek. He was previously at Binbrook Conservation Area, and has experience at both Long Beach and Chippawa Creek campgrounds.

The camping season will officially begin on Friday, May 21st.

Beamer Memorial Conservation Area

The 'hawkwatch' season ends May 15. Since the majority of the spring migration is completed by this time, the Niagara Peninsula Hawkwatch members will be able to take a break from daily counting. The group will now focus on providing their data to the larger North America Data Base for continental trends in the population of various raptor species.

Damage to the Bruce trail below the escarpment had staff out recently surveying the trail conditions. Staff observed an alarming amount of erosion, slope damage, and tree uprooting in one area near the escarpment toe. Staff are reviewing options for trail routing to avoid the hazard area.

St. Johns Conservation Area

The trout pond was opened on April 24, 2010. Approximately 200 people took part in the event by enjoying nature and trying their skills at fishing. Staff were on site during opening day to increase the public's awareness of fishing regulations and promote the Conservation Authority. The fishing and trout season will continue through September 30th at this site.

Jordan Marina

A spring cleanup by Authority staff is underway to improve security and safety for the public and potential donors who decide to visit the property. Hazard trees and debris have been removed, and areas groomed for parking and picnic use. The rowing club building electrical service is being upgraded, and additional fencing will be installed for the boat compound. The concrete pier is being used to tie up dragon boats. Additional shoreline cleanup, new site signage, and portable washrooms are slated to round out the site improvements for this season.

A formal public launch will take place on Sunday, June20th from 9:00 am to 1:00 pm. The event is being organized to showcase the site, bring awareness to the harbour and provide an opportunity for our partners to demonstrate some of the paddle activities available to the public. More information will be available in early June.

Wainfleet Bog Conservation Area

Staff met with OMNR to discuss research findings at the bog pertaining to Species at Risk. This information will be used by staff to further refine any site management initiatives being proposed to address the beaver activity. The goal of these discussions is to develop a management plan that could be implemented during this spring/summer to address trail impacts caused by flooding. Temporary site measures have been implemented to deal with the beavers and site usage in the interim.

Educational tours continue as a grade 7 group will be touring the site the end of May. The class will learn about the bog features and the beneficial functions wetlands provide in the landscape.

Glanbrook Landfill Wildlife

NPCA staff is assisting the Glanbrook Landfill operators, by identifying some inventory methods, monitoring programs and habitat restoration ideas for their Wildlife Council award application.

CA Highway Signage

The highway sign programme has been firmed up between staff and the Region of Niagara to replace our signs for Chippawa, the Comfort Maple and Ball's Falls this season. We are pleased to report that the Region is adding new signs for Ball's Falls on Jordan Road to improve direction for our visitors accessing the park from the QEW and Jordan Road exit. The sign order is now underway at the region.

For our Long Beach signs, staff will be working with the region and township to improve directional signage on township roads for the campground. The current signage in place by CTODS is on highway 3 and new signs will be added by CTODS to Station Road this year.

In the works for Binbrook is a strategy to place new signs at locations off the 403 and Red Hill Expressway to improve our highway presence. Hamilton CA has been consulted to review our plans and have no objections to signs we are proposing near or just inside their watershed boundary. Over the next month staff will proceed to further discussions with Tourism Hamilton, Hamilton traffic staff, and CTODS on our signage wish list.

NPCA Hunting Program

Staff have issued an additional 31 hunting permits for the NPCA Conservation Areas. To date 159 hunting permits have been issued for 2010. Of these, 25 permits are issued to individuals residing outside of our administrative area.

General Tick Season

Staff continue to work with the Region of Niagara Health Unit to develop a general fact sheet and information resources regarding ticks and possible exposure to lyme disease. The information will focus on personal precautions and safeguards to protect individuals and pets.

The tick population this spring is especially high. While there are already many calls regarding ticks, the vast majority are dog ticks or wood ticks. The Black legged tick is the primary vector of lyme disease in this area. Black legged ticks have been positively identified at the Wainfleet Bog Conservation Area.

Property Assessments

We are pleased to report that reconsideration of our assessments by MPAC has resulted in tax rebates being passed back to NPCA, with rebate cheques recently received for our Woolverton and Beamer properties.

COMMUNITY RELATIONS

Schools in Bloom

Staff attended the launch of the 2010 Schools in Bloom competition on May 5 at A.N. Meyer Secondary School. The Authority has partnered with this the City of Niagara Falls and the Niagara Parks Commission in this program for the past 5 years.

Earth Day Activities

The Authority held an Earth Day event at E.C. Brown Conservation Area. The event was attended by a number of local elementary schools students, MOE staff and members of the public. The day was very successful. We are continuing to support various Earth Day projects throughout the watershed with materials and prizes. A tree planting took place in partnership with the Fonthill Lions Club, 9th Welland Scouting Group. Trees Ontario took an interest in the project and included it in their promotional activities. Despite the cold and wet weather, the Scouts and Beavers, buoyed by the Mayor of Pelham did a great job with the plantings.

Trout Season Opening

Over 200 visitors attended the opening of the St. Johns Conservation Area Trout Season on April 24th. The weather was perfect and several media outlets were in attendance.

Upcoming Community Activities

The NPCA is partnering with the Region of Niagara during Public Works Week with displays at the Pen Centre to promote our programs and projects. We will take part in the Grimsby Community Safety Day on May 29th, and help out with The Welland Community Policing Committee Children's Casting Event at Chippawa Park in Welland on Saturday June 12th.

NIAGARA PENINSULA CONSERVATION FOUNDATION

Golf Tournament

Organization and planning for the 2010 Bob Welch Memorial Charity Golf Classic taking place on Tuesday, June 1st at the Whirlpool Golf Course is continuing. To date, 68 golfers are confirmed and $5,250 in sponsorship has been received. Staff is working to secure items for the silent auction. Activities will include a hole-in-one contest, with $5,000 being awarded to the golfer should they get the hole-in-one and $5,000 donated to our Foundation. Board members are encouraged to notify staff as soon as possible if they are planning to attend the event and if they have any leads for potential sponsors or donors of silent auction items.

Recommendation:

Report No. 33-10 outlining the status of Authority projects be received for information.

Respectfully Submitted by:_____

Tony D'Amario, P.Eng., CAO/Secretary-Treasurer