



Chamcook Watershed: The Path Forward

2012-2013 Atlantic Ecosystem Initiative Final Report

Chamcook Watershed: The path forward towards integrated watershed management

Hebb, Emma

2013

Published by:

**Eastern Charlotte Waterways Inc.
881 Main Street
Blacks Harbour, New Brunswick, Canada
E5H 1E5
Tel: (506) 456-6001
Fax: (506) 456-6187
E-mail: info@ecwinc.org
Web: www.ecwinc.org**



Reproduction of this report in part or full requires written permission from Eastern Charlotte Waterways Inc.

This Project was Undertaken with the Financial Support of the Government of Canada

Canada 

Contents

Introduction 1

 Chamcook Watershed..... 1

 Integrated Watershed Management 3

 Past Chamcook Watershed Planning 3

Background 4

 Review of Available Information..... 4

 Consultations 6

Watershed Plan..... 7

 Governance 7

 Education/Communication 8

 Water Quality..... 10

 Water Quantity 12

Endorsement..... 14

Works Cited..... 15

 Appendix 1 16

 Appendix 2 18

Introduction

Chamcook Watershed

The Chamcook Watershed is located in southwestern New Brunswick between the rural communities of Bayside and Chamcook, and near the Town of Saint Andrews. The watershed is comprised of six lakes: Chamcook Lake, Limeburners, Little Chamcook Lake, Gibson Lake, Welch Lake and Snowshoe Lake, and their drainage areas. The estimated total watershed area is 2.46 km², with the total area covered by lakes being 497 ha and 4% of the watershed area being natural wetlands (FOREAU Consultants, 2008).

Chamcook Lake, the largest lake of the watershed, is used as a drinking water supply for the Town of St. Andrews. It is also the water source for a hatchery, owned by the Atlantic Salmon Federation (ASF), but at the time of writing operated by the Huntsman Marine Science Centre (Huntsman). Chamcook Lake is also the water source for the Champlain Industrial Park in Bayside and by extension provides water to the Bayside Port Corporation. In this way, the Chamcook Watershed is a small system that provides potable water for several major users.

Along with its use as a potable water supply, Chamcook Watershed also supports recreation. Fishing, hunting, hiking, swimming, boating, and all-terrain vehicle activities are valued recreational uses of the watershed area. There were 89 waterfront properties identified in 2007 (FOREAU Consultants, 2008), beyond these resident users the system is also widely used by the public for recreation.

Chamcook Watershed is a designated watershed protected area under the Clean Water Act. As such, uses of the watershed have been restricted by the Watershed Protected Area Designation Order in order to protect the use of the lakes as a potable supply for the Town of St. Andrews. These restrictions have unintentionally caused tension between the town and other stakeholders, who were not consulted before the designation took effect. Figure 1 is a map of the Chamcook Watershed as it relates to the designation order.

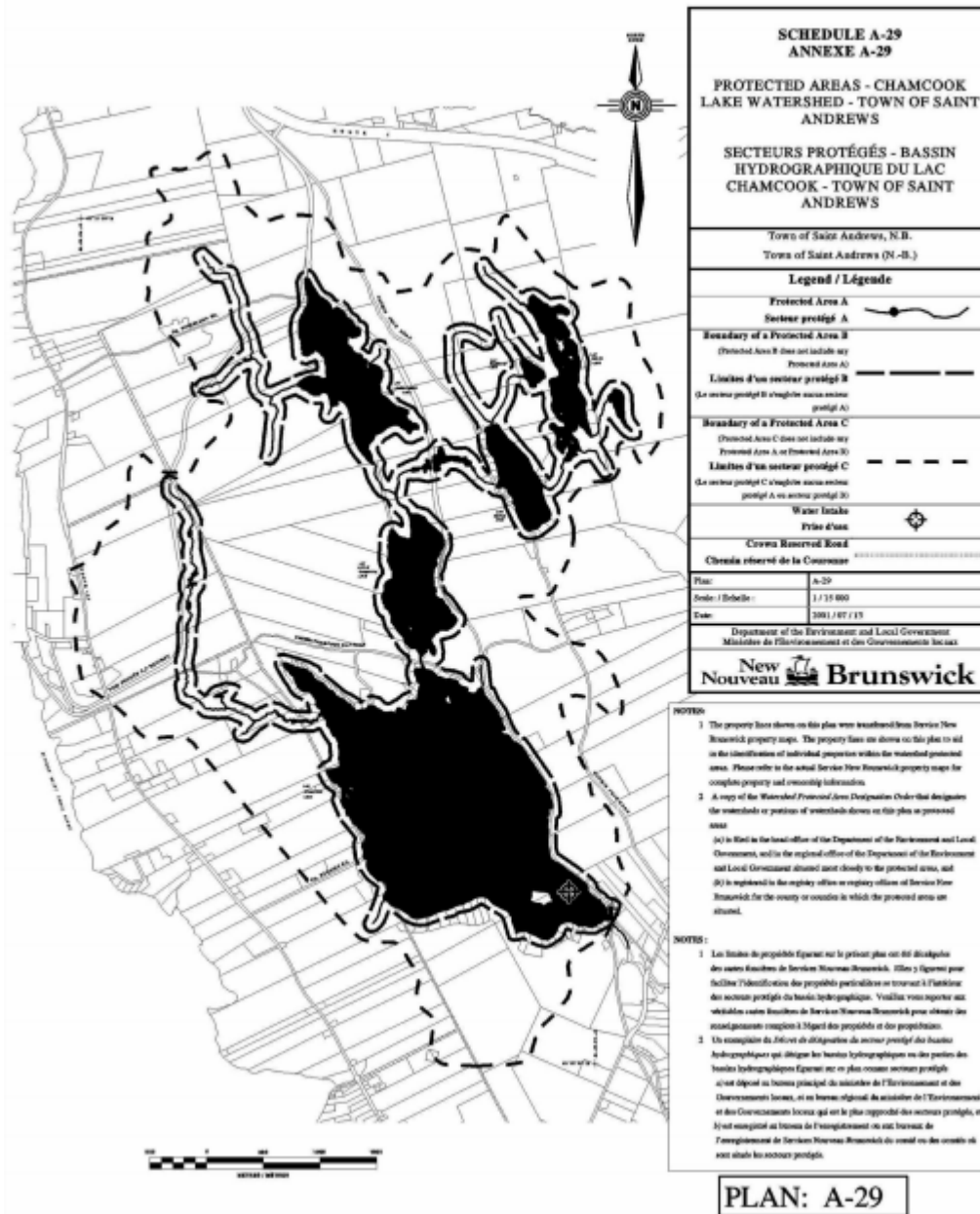


Figure 1: Chamcook watershed map, as per the watershed protected area designation order

During the 1990s and in 2010 there were several years in which low flows caused stakeholders to have concerns relating to water quantity (Tinker, 2013). Also in 2010 there was a cyanobacteria bloom, and cyanobacteria has proliferated in the system every summer since, in 2011 and 2012. Given these water quality and quantity concerns, various stakeholders have been working on analyzing water quality and determining the natural flows and mass balance of the system (Tinker, 2013). The stakeholders, under facilitation of the Town of St. Andrews, have formed the Chamcook Watershed Multi-Stakeholder Committee, which meets regularly to discuss these issues and the initiatives undertaken by the various groups. Since the committee's inception it has worked towards developing collaborative decision making processes and initiatives. In 2011, Thrive Consulting worked with stakeholders on the

committee to develop a proposed committee structure and terms of reference. A preliminary action plan was circulated to members of the multi-stakeholder committee at a committee meeting on February 8, 2012. Unfortunately, while much work has been done to develop the committee, stakeholder efforts have not always been coordinated collaboratively or communicated transparently to the others. Also, landowners within the Chamcook Watershed only recently (July 2012) formed an association, the Chamcook Watershed Landowners' Association (CWLA). Prior to CWLA's formation, it was difficult to ensure that landowners were well represented on the multi-stakeholder committee, and also to involve them in committee initiatives. This plan has been developed to build on the existing multi-stakeholder committee by formalizing its structure, providing objectives, and improving communications.

Integrated Watershed Management

Integrated Watershed Management (IWM) is a multidisciplinary process that seeks to optimize the contribution of aquatic resources to the social, environmental, and economic welfare of humans while maintaining the integrity of aquatic ecosystems, both now and in the future (Environment Canada, 2010). The goal of IWM is to bring together the work of federal and provincial government, Aboriginal peoples, municipalities, industry, agriculture, non-governmental organizations, community groups, and research teams into full partnership in the process of planning, decision-making, management, and implementation of watershed based management plans (Environment Canada, 2010). The main components of IWM are:

- **Governance** mechanisms that are across jurisdictions and include all stakeholders
- **Science** as a base for decision making
- A spectrum of **tools** including public education, regulation, and market based instruments
- Continuous **assessment** of progress and implementation of improvements

Traditionally water management has been based on water allocation issues, but this did not account for the other values associated with water systems, or the biological integrity of the systems themselves.

Past Chamcook Watershed Planning

The Chamcook Watershed has been subject to non-integrated planning in the past. The provincial Watershed Protected Area Designation Order includes regulatory restrictions that are implemented uniformly on all designated watersheds, without consideration of unique stakeholder values. In Chamcook, this has led to a portion of the industrial park being included in the watershed area and being subject to the restrictions. While the Port of Bayside and the Champlain Industrial Park have a mandate to develop the park, the restrictions have made attracting new business difficult, because they cannot guarantee that exemptions to allow for development will be made. Also, private landowners within the watershed have had their recreational use of the system limited by the restrictions. The New Brunswick Department of Environment and Local Government (DELG) have also had to spend time on

evaluating and issuing exemptions under the order to allow for reasonable development of shoreline properties, such as stairs for lake access, or construction of outbuildings. While the regulations are designed to protect the system as a potable water source, they were not developed in collaboration with local stakeholders and they have not been accompanied with education or explanation as to why the restrictive measures are necessary. This has caused animosity amongst affected stakeholders as there is a sentiment that regulations have been forced upon them. This has also complicated communication amongst stakeholders and made it difficult to move forward in managing the system. It has been recognized that uniform regulations do not effectively manage complex water issues and that tailored approaches are more effective (Environment Canada, 2010). Other jurisdictions such as Alberta, Ontario, and Nova Scotia have all included more integrated planning as part of their source water protection planning process (Environment Canada, 2010). While it is beyond the scope of this document to change provincial legislation, it would be advantageous for the Government of New Brunswick to consider changes to the implementation of the Watershed Protected Area Designation Order. The order should take into account the unique issues in each watershed, involve stakeholder consultation, and encompass an educational element.

The last Chamcook Watershed Plan was commissioned by the Town of St. Andrews. It was a four year plan to deal with potential point-source pollution sources that was scheduled to commence in 2008 (FOREAU Consultants, 2008). Unfortunately, many of the proposed actions of the plan were not within the power of the town to complete. While the town has made an effort to provide the plan to provincial government bodies that have jurisdiction within the watershed, they have seen little progress made towards the goals of that plan. This highlights the need for governance mechanisms that include all stakeholders. It is the hope that this new integrated management plan will provide a path forward for Chamcook Watershed stakeholders that all can take ownership of.

Background

Review of Available Information

In order to facilitate planning for future projects, an effort was made to compile what information currently exists for the Chamcook Watershed.

The Chamcook Watershed is part of two DELG monitoring programs: the recreational lakes monitoring program, and the drinking water program. The recreational lakes monitoring program contains monitoring at six locations on Chamcook Lake. Locations on the other five lakes and from the major wetland areas are part of the drinking water program. Water quality data obtained through these programs is available from DELG upon request. While sampling is not done annually, the programs have existed for many years allowing for multiple years of water quality data to be accumulated.

The Canadian Rivers Institute (CRI) has also done monitoring on Chamcook Lake as part of their work to establish a long term lake monitoring program for New Brunswick. As part of the program Chamcook

Lake had a full analysis of water quality, plankton, benthos, and fish. The results of that monitoring have yet to be released publicly, but should be available in the near future.

Also as part of this study several formal reports were reviewed in order to assess what information they could provide to future planning. Table 1 summarizes these reports and gives a brief description of their content.

Table 1: Past reports viewed as part of the planning process

| Year | Author | Title | Brief Description |
|-------------|--|--|---|
| 1977 | D.G. Wilder | Water Quality Survey Chamcook Watershed | An analysis of cottage distribution, boating, nutrients, pH, and coliforms. It focuses mostly on Chamcook Lake and Gibson Lake as they have the most cottage development. |
| 2001 | Natech | Chamcook Watershed Hydrotechnical Study | A hydrology study of the Chamcook Watershed, that uses known data (for evaporation, flows, etc) from nearby water systems and applies them to the Chamcook system |
| 2008 | Foreau Consultants | Chamcook Watershed Description and Management Plan | A three part study of the Chamcook Watershed. Part one describes the system, including dams, waterway crossings, and current activities. Part two describes potential point source pollution sources. Part three outlines a four year plan and the associated costs to resolve identified pollution sources. |
| 2012 | Eastern Charlotte Waterways | An Investigation of Cyanobacteria Dynamics in Three Southwest New Brunswick Lakes: Utopia, Chamcook, and Digdeguash | An analysis of data compiled during the 2011 field season on three lakes, one was Chamcook Lake. Phytoplankton speciation, sediment analysis, and analysis of physical and inorganic water quality were all included as part of this study. |
| 2013 | Steve Tinker, Atlantic Salmon Federation | Chamcook Watershed Monitoring and Protection Project-Final Report | An analysis of temperature, oxygen, and water flow volumes for major outflows in the Chamcook Watershed. |
| 2013 | Emma Hebb, Eastern Charlotte Waterways | Monitoring Vulnerable Southwest New Brunswick Lakes-Summary of Monitoring Activities on Digdeguash Lake, Chamcook Lake, and Lake Utopia 2012 | An analysis of data compiled during the 2012 field season on three lakes. Includes continuous temperature and depth data for Chamcook Lake, Gibson Lake, and Snowshoe Lake, and microbiological analysis for major outflows. Also includes analysis of physical and inorganic water quality and analysis of town and province water quality data. |

Consultations

In order to ensure that all stakeholder views were considered when designing the plan, meetings were held with individual stakeholders. An effort was made to ensure that all stakeholders were aware of the opportunity to contribute to the plan through consultation. Six meetings were held and stakeholders were represented from the following groups: Chamcook Local Service District, Town of St. Andrews,

Atlantic Salmon Federation, Huntsman Marine Science Centre, the Port of Bayside, Champlain Industrial Park, and the Chamcook Watershed Landowners' Association. Every effort has been made to ensure this plan represents the views of the stakeholders and takes into account their concerns.

Watershed Plan

What follows is a list of objectives as they relate to governance, education/communication, water quality, and water quantity for the Chamcook Watershed. Each objective has been given a lead stakeholder and an anticipated completion date. It is not expected that lead organizations would complete the work in isolation, rather that they would work with other stakeholders to accomplish the objective. Short hand names for stakeholders have been used to make the plan less cumbersome. A list of these terms is summarized in table 2.

Table 2: List of short hand names for Chamcook Watershed stakeholders

| Short Hand | Full Name |
|------------|--|
| DELG | New Brunswick Department of Environment and Local Government |
| DH | New Brunswick Department of Health |
| Town | The Town of St. Andrews |
| IP | Champlain Industrial Park |
| CWLA | Chamcook Watershed Landowners' Association |
| ECW | Eastern Charlotte Waterways Inc. |
| ASF | Atlantic Salmon Federation |
| Huntsman | Huntsman Marine Science Centre |

Governance

| Objective 1 | Lead | Completion | Evaluation |
|--|------|------------|------------|
| Develop and Adopt formal Terms of Reference for the Multi-Stakeholder Committee | | June 2013 | |

As mentioned previously, governance is an important component of any integrated watershed management. The current multi-stakeholder committee is convened and the agenda set by the Town of St. Andrews. There is great appreciation for the town's initiative in developing the committee over the past several years. However, going forward it is important to formalize the governance structure of the committee to ensure that stakeholders are part of the decision making process. A draft terms of reference for the committee was developed in April 2011 but would need to be updated and revised before its adoption. From consultations it was apparent that open and transparent communication between stakeholders is paramount moving forward. In fact, while stakeholders said what concerned them most was water quality of the system, the majority of comments had to do with frustrations over lack of communication or consultation amongst stakeholders. It is important to have a body which

represents all stakeholders and can help facilitate communication and coordinate efforts as they relate to this plan.

| Objective 2 | Lead | Completion | Evaluation |
|---|-------------|-------------------|-------------------|
| Develop and Adopt an Evaluation Plan for this Document | | September 2013 | |

Once the multistakeholder committee is formalized via objective 1, the committee will develop a system of evaluation for this plan. It will include regular, suggested annual, progress reporting on objectives by lead organizations to the whole committee. As it is recognized that many of the outlined objectives are funding dependant, the evaluation plan should also include a method for revision of objectives and timelines.

Education/Communication

| Objective 3 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Public Education Session About the Watershed Protected Area Designation Order | DELG/CWLA | September 2014 | |

There is a need for education around the reasoning behind protecting the Chamcook Watershed under the designation order. Those directly affected by the measures would appreciate a better understanding of how the restrictions were developed and what is the basis (scientific or other) for them. It is recommended that the Department of Environment and Local Government (DELG) coordinate the session with the Chamcook Watershed Landowner’s Association to ensure it is well communicated to affected landowners. Having a public session will allow landowners to have their questions about the order answered and allow DELG to hear directly what concerns relating to the order are. It is hoped that this will lead to better communication between landowners and those tasked with enforcing the designation order. Since this is designed to be a public session it is hoped that all interested stakeholders will be able to attend.

| Objective 4 | Lead | Completion | Evaluation |
|---|--------------|-------------------|-------------------|
| Public Education Session about Septic System Best Practices in Light of the Watershed Protected Area Designation Order | DELG/DH/CWLA | September 2014 | |

One of the point sources identified in the Foreau report was septic systems. The report goes on to identify ones they feel may be insufficient. Through consultation it was found that because the town doesn’t have jurisdiction within the watershed it doesn’t have the ability to fix the problem. Landowners have expressed a willingness to upgrade deficient systems, however they require leadership from DELG and DH to properly comply with the designation order when removing old systems and choosing replacements. Therefore, it is recommended that DELG, DH and CWLA

collaborate to provide public information sessions about septic systems, with special consideration of any unique requirements per the designation.

| Objective 5 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Public Signage of Restrictions under the Watershed Protection Area Designation Order be Developed and Posted at Popular Boat Launches | DELG | June 2013 | |

Current signage relating to the designation order within the watershed only indicates that the area is designated but does not provide specific restrictions. Landowners have expressed frustration with public users not adhering to the restrictions. It is recognized that capacity for enforcement of the designation order is limited. Therefore, it is felt that signage should be posted highlighting those restrictions in the order that apply to public users (boating and swimming). It is hoped that by making the public more aware of the restrictions compliance will increase.

| Objective 5 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Develop Guidelines as to what type of Industrial Development would be Permissible within the Watershed Protected Area | DELG | March 2014 | |

A large portion of the Champlain Industrial Park is included in the watershed area. The industrial park has goals to further develop the park. The Bayside Port Corporation sees itself as an economic driver for the area and would also like to see the park further develop. Any type of future development would be subject to the designation order, and would most likely require exemptions. It would be favourable for DELG to provide both the park and port with the guidelines it would use when considering whether a future development should be exempt. This will allow the park and port to focus their development plans on industries that would be acceptable, rather than having potential development falter because of the designation order.

| Objective 6 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Organize an Education Session on Erosion Control, Especially as it Relates to Private Roads | CWLA | September 2015 | |

The Foreau report identified sedimentation from eroding roads as a potential sedimentation source for the system (FOREAU Consultants, 2008). Many of the roads within the watershed are privately held, including what used to serve as the rail bed. When the town approached the Department of Transportation in 2012 the department was open to providing a workshop on erosion control for landowners. Now that landowners have a formal organization it would be best if they were to approach the Department of Transportation to set up such a workshop. The CWLA should also offer sessions on shoreline development best practices and run off control. Such sessions' content would be developed in collaboration with knowledgeable members of the multi-stakeholder committee. Education around

proper road maintenance and shoreline development will hopefully lead to a decrease in sedimentation of the system.

| Objective 7 | Lead | Completion | Evaluation |
|---|-------------|-------------------|-------------------|
| The Town and Industrial Park Consider Conservation Based Pricing | Town/IP | March 2016 | |

Water is being abstracted out of the watershed and sold to users by both the town and industrial park. Conservation based pricing is pricing water in such a way that it encourages conservation and assigns the true costs of water infrastructure to the customer. A brief on conservation based pricing from the Polis Water Sustainability Project (Brandes, Renzetti, & Stinchcombe, 2010) is Appendix 1. Currently water from Chamcook Lake is not priced in a way that encourages users to conserve, or provides the funds needed to update infrastructure. It is recognized that provincial regulations mandating the system be operated at an annual net zero cost (as per Municipalities Act 189(4)) will make these types of changes difficult. However, given that the watershed is a limited potable water source it is paramount that all major users consider ways in which they can conserve or encourage conservation.

| Objective 8 | Lead | Completion | Evaluation |
|---|-------------|-------------------|-------------------|
| The Development of a Document that Includes Contact Information for “who to call when” | CWLA | August 2013 | |

Many of the consultations revealed that stakeholders have little understanding of who is responsible for resolving issues that arise within the watershed. For instance, “Who is responsible for removing beaver dams or other obstructions to flow?” “Who do I contact about getting an exemption to the designation order?” This document would be developed collaboratively with all the stakeholders and then distributed amongst them. A similar document developed by the Yoho Lake Association (Yoho Lake Association, 2012) is Appendix 2.

Water Quality

| Objective 9 | Lead | Completion | Evaluation |
|---|-------------|-------------------|-------------------|
| Continuation of Long Term Water Quality Monitoring | DELG/ECW | Ongoing | |

It is important that the long term data set for the six sampling sites on Chamook Lake, the sampling of upper watershed lakes, and the sampling in major wetland areas continue. While this is mostly done by DELG, Eastern Charlotte Waterways has helped supplement this data in recent past and has intentions to continue to do so. This will provide the multi-stakeholder committee with current and historic data for various locations throughout the watershed. Communication of these results to the multi-stakeholder committee should be more open over time, allowing all stakeholders access to the data.

| Objective 10 | Lead | Completion | Evaluation |
|---------------------|-------------|-------------------|-------------------|
|---------------------|-------------|-------------------|-------------------|

| | | | |
|---|-----|----------------------|--|
| Water Quality Monitoring to Determine Nutrient Sources | ECW | Starting summer 2013 | |
|---|-----|----------------------|--|

Currently there are only hypotheses about where cyanobacteria may be getting their nutrients. While the historic sampling locations are well spread throughout the system they don't indicate a nutrient source. There are questions about the quality of water in the flowage area between Limeburners and Gibson, which eventually flows into Little Chamcook. There are also questions about the quality of water that comes out of the Ducks Unlimited Marsh during spring freshet. With so much uncertainty, it is important to expand monitoring to help identify potential nutrient sources. Eastern Charlotte Waterways will add water quality testing locations throughout the watershed based on needs identified by members of the multi-stakeholder committee, throughout the life of the plan.

| Objective 11 | Lead | Completion | Evaluation |
|-------------------------|-------------|----------------------|-------------------|
| Sediment Testing | ECW | Starting summer 2013 | |

ECW had several grab samples for sediment analyzed in 2011. However, there was no historic data to compare these results to. The extent to which nutrients are available to cyanobacteria in the soil is important to continue to evaluate. There has also been concern that areas sampled were offshore and that near shore sediment analysis may be of more use when determining nutrient sources. ECW will collaborate with members of the multi-stakeholder committee and with experts to determine proper siting and methodology for sediment testing over the life of this plan.

| Objective 12 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Continued Monitoring of the Phytoplankton Community | ECW | Ongoing | |

Since 2010, Chamcook Lake has had annual proliferations of cyanobacteria. It is important to continue to monitor the phytoplankton community to assess what species are present within the lake. ECW was able to provide full analysis of the phytoplankton community for 2011 and 2012 to stakeholders. ECW will continue to monitor the ecology of the phytoplankton community over the length of this study.

| Objective 13 | Lead | Completion | Evaluation |
|---|-------------|----------------------------------|-------------------|
| More Comprehensive Toxicity Testing on Chamcook Lake | ECW | Starting summer 2013- Ongoing | |

The town is currently required to test for microcystin, a common cyanotoxin, and no immediate toxic effects have been reported from recreational users of Chamcook Lake. However, there is growing concern amongst stakeholders that toxicity testing is not comprehensive enough, and that the water in Chamcook Lake is potentially toxic. There is also concern about the potential long term health effects associated with drinking and/or recreating in the water. While no toxicity testing will ever be definitive, as there are hundreds of potential toxins, it is important to test for more toxins in order to help allay fears.

| Objective 14 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Literature Review what Conditions Cause Cyanobacteria Species Present to Release Toxins | DH | March 2014 | |

Similar to the last objective, the potential toxicity of Chamcook Lake has created considerable stakeholder concern. Therefore, it is essential that every effort be made to provide stakeholders with all available information on the topic. If the literature review reveals that the species present in Chamcook is unlikely to release toxins, this will help stakeholders regain confidence in the water quality. If it is found that under certain conditions the species does release cyanotoxins, those conditions can become a priority.

| Objective 15 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Identify and Control Nutrient Sources within the Chamcook Watershed | ECW | March 2017 | |

By continuous monitoring over the life of this integrated watershed plan, it is hoped that by the end of the plan the source of nutrients for cyanobacteria in Chamcook Lake will be identified. This will allow the next plan to work towards managing those sources.

| Objective 16 | Lead | Completion | Evaluation |
|---|-------------|-------------------|-------------------|
| Assess what extent Giardia may be a threat to Public Health within the watershed | DH | March 2014 | |

There has been a reported increase in the prevalence of beavers within the watershed over the past ten years. The extent to which giardia is an issue is not known and should be assessed.

Water Quantity

| Objective 17 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Continued Monitoring of Natural Flow Patterns | ASF | March 2015 | |

There is not a strong understanding of how water naturally moves through the watershed. It is important before determining how much water can be abstracted from the system, that the amount of water available in the system be better understood. Information on natural flow patterns is essential for the proper management of the dam, and also in order to avoid of extremely high water levels that cause bank erosion. It's also essential for the management of extreme rainfall events to avoid or minimize damage to property from high water levels. The Atlantic Salmon Federation started doing flow monitoring in 2012. By compiling data over several more years, stakeholders will have a greater knowledge of the system.

| Objective 18 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Developing a Protocol for Dealing with Obstructions to Flow | | March 2014 | |

As the Chamcook Watershed provides potable water for various users, it is important that flows be maintained throughout the system. In 2010, there was an issue with a beaver dam that was blocking flow out of Gibson Lake; this caused considerable draw-down of the water levels on Chamcook Lake. In order to ensure that this does not happen again there needs to be a protocol that identifies who is responsible for removing obstructions. There also needs to be a monitoring programme that can identify these obstructions in a timely manner.

| Objective 19 | Lead | Completion | Evaluation |
|---|---------------------------|-------------------------|-------------------|
| Report Water Use, and Develop an Auditing System | Town, Huntsman/ASF, IP | Starting summer 2013 | |

All major users of water from Chamcook Lake are now equipped with meters. It is recommended that all major users begin reporting their water use to the multi-stakeholder committee at agreed upon intervals. There has been distrust amongst stakeholders regarding the accurate reporting of water use. Therefore, it is recommended that the committee itself develop an auditing system whereby other members of the committee verify usage data submitted by major users.

| Objective 20 | Lead | Completion | Evaluation |
|---|-------------|-------------------|-------------------|
| A Hydrological Study of the Chamcook Watershed | Town | March 2016 | |

Past hydrological studies of the watershed applied available data from other watersheds to Chamcook. There has not been an effort to ground truth those assumptions, or collect the necessary data to conduct a hydrology study properly based in Chamcook. It is important that the natural system is understood before water allocations are assigned. Altered hydrology is also recognized as a key cause of cyanobacteria blooms. Some of the data collected as part of this plan could feed into that study. The terms of reference for such a study should be developed in collaboration with the multi-stakeholder committee. The town has expressed interest in securing the necessary funds for such a study.

| Objective 21 | Lead | Completion | Evaluation |
|---|-------------|-------------------|-------------------|
| An Assessment of Future Water Needs Based on Development | Town, IP | March 2015 | |

Currently, water users are not exceeding their water allotment. However, some users have future plans for development and expansion. Therefore, any future allocations would have to account for this potential future use. It is recommended that major users provide the committee with an assessment of what they feel those future needs would be, taking into account conservation measures.

| Objective 22 | Lead | Completion | Evaluation |
|---|-------------|-------------------|-------------------|
| An Assessment of how Climate Change will impact Water Quantity | ECW | March 2015 | |

Any changes to the water budget or allocations must take into account the future state of the watershed. Climate change will impact the Chamcook Watershed, and its probable effects on the water source should be evaluated.

| Objective 23 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Dam Operational Protocols are Developed | Town | March 2014 | |

The town is responsible for the operation of the dam on the outflow of Chamcook Lake. In collaboration with the landowners and other stakeholders, the town should establish operational protocols for the dam that ensure stable lake levels. The levels should take into account the ecological needs of the outflow stream and any migratory fish populations, decreasing shoreline erosion/sedimentation, and the value of the system's recreational uses.

| Objective 24 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| Current state of the Town Dam Evaluated and Improvements Made | Town | March 2017 | |

The current dam has been in operation for decades. As such, it must be evaluated, and repairs that are required for continued operation must be prioritized and actualized. Improvements to migratory fish passage should be implemented as part of dam refurbishment.

| Objective 25 | Lead | Completion | Evaluation |
|--|-------------|-------------------|-------------------|
| A Revised Water Budget for the Chamcook Watershed | | March 2017 | |

A revised water budget and water allocations should only be undertaken once there is a strong understanding of how much abstraction the watershed can support while maintaining ecological integrity. The new budget should take into account the effects of climate change and the future development plans of both the town and industrial park. The budget should also take into account the intrinsic value of the watershed to local landowners and public users.

Endorsement

Once we have a better idea of who is willing to sign on to the plan this section would have signature lines indicating the stakeholder group and their representative

Works Cited

- Brandes, O. M., Renzetti, S., & Stinchcombe, K. (2010). *Worth Every Penny: Conservation Oriented Water Pricing in Canada*. Victoria, BC: Polis Project.
- Eastern Charlotte Waterways Inc. (2012). *An Investigation of Cyanobacteria Dynamics on Three Southwestern New Brunswick Lakes*. Blacks Harbour, NB: Eastern Charlotte Waterways.
- Environment Canada. (2010, November 23). *Integrated Watershed Management*. Retrieved February 25, 2013, from Environment Canada: <https://www.ec.gc.ca/eau-water/default.asp?lang=En&n=13D23813-1>
- FOREAU Consultants. (2008). *Chamcook Watershed Description and Management Plan*. Edmunston, NB: FOREAU Consultants.
- NB DNR. (1969). *Lake Survey Summaries: Chamcook*. Fredericton, NB: Government of New Brunswick.
- Tinker, S. (2013). *Chamcook Watershed Monitoring and Protection Project Final Report*. Chamcook, NB: Atlantic Salmon Federation.
- Wilder, D. (1977). *Water Quality Survey: Chamcook Watershed*. St. Andrews, NB: Issued by the Town of St. Andrews.
- Yoho Lake Association. (2012). *Roles and Responsibilities with Respect of Complaints*.

Appendix 1

Worth Every Penny: Conservation-Oriented Water Pricing in Canada

Conservation-oriented pricing is a rate structure adopted by water service providers where costs are fully recovered. Individual customers are metered and pay for the volume of water they use, and the price charged is sufficient to influence consumers' decisions about water use and to encourage efficiency.

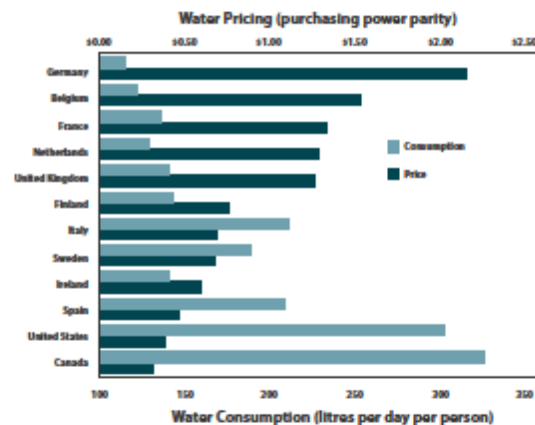


Inevitably, society has to pay for the infrastructure and services that store, treat and distribute water to our homes and businesses. Yet, Canadians typically pay for only a portion of these costs through regular water bills. In fact, Statistics Canada figures show that, in 2007, expenditures by water service providers were on average 30% higher than revenues collected from water bills. The remaining expenditures must be postponed, leading to the deterioration of urban infrastructure and system reliability problems. Alternatively, costs must be subsidized from other sources, including infrastructure grants from provincial and federal governments or municipal government general revenue. This keeps the retail price of water artificially low.

A better approach, environmentally and economically, is to begin charging households and businesses for the real costs of water services. Most people and organizations will change their behaviours simply because they recognize that conservation will save them money. The water service provider is interested in achieving these greater efficiencies because it will mean better use of scarce operational capital, deferred future expansion costs, and reduced environmental impacts.

Moving communities to more effective water pricing will take time and courage on the part of municipal and senior government leaders. Most municipalities will want to take a gradual approach to implementing pricing improvements, sometimes over a number of years. This allows time to mitigate any potentially negative impacts and to build community support. Improving pricing makes sound sense from both business and environmental perspectives. Continuing to waste water and not generating enough revenue to fund the operation of water supply systems are in nobody's interest.

Canadians pay much less for urban water services than people in most other developed countries. We are also among the highest per capita water consumers in the world.



Source: Council of Canadian Academies. (2009). *The Sustainable Management of Groundwater in Canada: Report of the Expert Panel on Groundwater*. Ottawa.

Note: Comparing water use statistics among countries presents challenges. However, the data used above are reasonably accurate and sufficient to illustrate that Canadians use more water than people in other developed countries and that there is a strong correlation with pricing.

CONSERVATION-ORIENTED PRICING: CHANGING CHOICES THROUGH THE WATER BILL

The price charged for water services should achieve the following objectives:

1. generate enough revenue for water service providers to cover the full costs of services, including infrastructure maintenance and replacement;
2. signal the actual costs of supplying water and provide a financial incentive for customers to use it more efficiently;
3. promote innovation by encouraging engineers, inventors and investors to develop more water-efficient practices and technologies.

Preconditions for a progressive pricing system:

1. individually metered water connections;
2. volumetric charging (where users are charged for the amount of water they use);
3. a water rate that is sufficiently high to influence consumers' decisions about water use and the purchase of appliances and fixtures.

Conservation-Oriented Water Pricing

FREQUENTLY ASKED QUESTIONS

Do water systems need to be metered to introduce conservation-oriented water pricing?

Metering is a prerequisite for volume-based pricing. It is a beneficial general management practice that allows service providers to better account for water use and measure performance.

Will conservation-oriented pricing result in less stable revenues from water bills?

When a water service provider increases its reliance on volume-based pricing, its revenue may fluctuate more. Fortunately, there are many options to minimize the impacts of revenue variability and avoid budget shortfalls, including: using "rolling average" pricing, establishing reserve funds, and having part of the bill include a fixed component (a "connection charge") that does not change with the volume consumed. Careful planning and revenue forecasting also go a long way towards mitigating this concern.

Does it disadvantage low-income families?

Low-income people spend a disproportionate amount of their earnings on water bills, so some fear that price increases will hurt them more than others. But this challenge can be minimized. Service providers can provide people in need with a low cost "lifeline block" to meet basic water requirements. Incentive programs like product rebates can be targeted to disadvantaged groups. Some low-income families may actually experience a decrease in their bills because they have more control over costs.

Do senior governments have a role?

Provincial and federal governments can provide guidelines and best practices on matters such as asset management and accounting practices. They can also provide incentives via conditions for infrastructure grants, create supportive regulatory environments, and reduce legislative barriers to how costs can be recovered.

Has anyone in North America already implemented it?

Some water utilities in the United States have used conservation-oriented pricing approaches for many years, including Seattle and San Antonio. In Canada, a number of cities have started price restructuring with good success, including Toronto, Guelph and Halifax. Information on the systems in all of these places is readily available and others can learn from their experiences.

KEY MESSAGES

- It makes sound sense from both environmental and economic points of view.
- It can lead to lower operating costs for water service providers and fewer environmental impacts because less water needs to be treated, pumped and heated.
- It can help to defer the need to construct major new infrastructure like dams and treatment plants, saving money and reducing environmental impacts.
- It can contribute to improved financial performance for service providers. The goal is to ensure that the amount of revenue from water bills is sufficient to cover the full costs of operating now and in the future.
- Potentially negative consequences for communities can be mitigated.
- It allows individuals much greater control over their water costs. Depending on how it is implemented, those who choose to conserve may actually see a decline in the amount they pay.
- It's a question of fairness. Why should prolific water users pay the same amount as those who do their best to conserve?
- There is no evidence that it leads to privatization of water infrastructure. In fact, more effective cost recovery can actually strengthen publicly owned utilities.
- Revenue generated by conservation-oriented pricing can be reinvested in the water supply system.
- Improved pricing provides a strong incentive to innovate. When water is valued more, engineers, inventors and investors are motivated to develop more water-efficient practices and technologies.
- Many other places around North America and the world are successfully doing it.

A full-length primer on conservation-oriented pricing is available at www.poliswaterproject.org



POLIS Project
Ecological Governance
UNIVERSITY OF VICTORIA

CWWA ACEPU
Canadian Water Workers Association

econnics
eco-efficiency specialists

University of Victoria



action HO₂
www.actionho2.ca



Environment
Canada

Environnement
Canada

Appendix 2

YOHO LAKE ASSOCIATION

Roles and Responsibilities with Respect to Complaints

In the spirit of the Constitution and By-Laws (August 2012) for the Association, the activities of the Association are targeted at fostering and promoting the protection of the natural environment of the Yoho Lake watershed.

In undertaking activities it is not the intent of the Association, its Executive or Standing Committee Chairs and its members to regulate and enforce any municipal, provincial or federal legislation that governs activities that may impact the Yoho Lake Watershed.

Based on this the Association, its Executive and members of the various standing committees are available to support members or residents in identifying if possible, the appropriate regulatory authority and contact.

Departments having legislative authority relating to water quality, zoning, fish habitat, recreational fisheries and wildlife are:

Provincial Department

Natural Resources
Environment and Local Government
Health

Federal Department

Fisheries and Oceans Canada

Rural Planning Commission

CONTACT INFORMATION

Natural Resources

Fish and Wildlife Branch
Fredericton
Phone: 453-3826
Region 3 HQ
Phone: 453-5237

Environment and Local Government

Regional Office
Fredericton
Phone: 453-2893

Department of Health

Health Protection
Regional Office
Fredericton
Phone: 453-2830

Fisheries and Oceans Canada

Conservation and Protection
Fredericton
Phone: 452-3018

Rural Planning District Commission

Phone: (506) 453-2956
Toll Free: 1-866-453-2956