An Informational Document regarding the proposed EnviroScience Solution to our Milfoil problem

Big Cedar Lake Stewardship Association

March, 2011

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Big Cedar Lake Stewardship Association - BCLSA

Background

- Not for Profit organization officially formed in March, 2011
- 8 Committee Members (includes 3 Directors)
- Initial Objectives
  - the preservation and improvement (or regeneration) of the environmental health of Big Cedar Lake in the Province of Ontario and its surroundings;
  - serving as a focal point for Big Cedar Lake stewardship and improvement projects;
  - providing information concerning matters related to the Big Cedar Lake community; and
  - providing a forum for Big Cedar Lake users to meet and get to know each other.
- BCLSA enrolment form was sent to all cottagers in March, 2011
- Annual General Meeting planned for Spring, 2011

Introduction

The Committee would like to thank you for your interest in restoring the quality and usability of Big Cedar Lake - BCL

This document includes an overview of the Milfoil problem we are experiencing and the proposed EnviroScience Solution. We have also included a list of Committee generated questions and their answers, references from other lakes and next steps required.

EnviroScience visited our lake in Fall, 2010 and has put together a proposal to help us address our Milfoil problem – a summary of the proposal follows. The investment costs have been summarized and funding options have been researched. We have also included some website links for those who would like to conduct some research on your own.

This document also includes a list of next steps to ensure we can start restoring the quality of our lake as soon as the Spring of 2011

Milfoil Problem

- Milfoil has become a very serious problem for BCL over the last 3-5 years
- Milfoil is a very aggressive aquatic plant and is not like our native lake weeds – it is extremely invasive and within a few more years will virtually fill our shallow bays and line the edges of BCL with weeds
- Some cottage owners have tried various methods to control the weeds – “mats”, “cutting” – very expensive and labour intensive – not a long term solution and nobody wants to use chemicals
- Each piece of Milfoil has the potential to root and form a whole new colony.

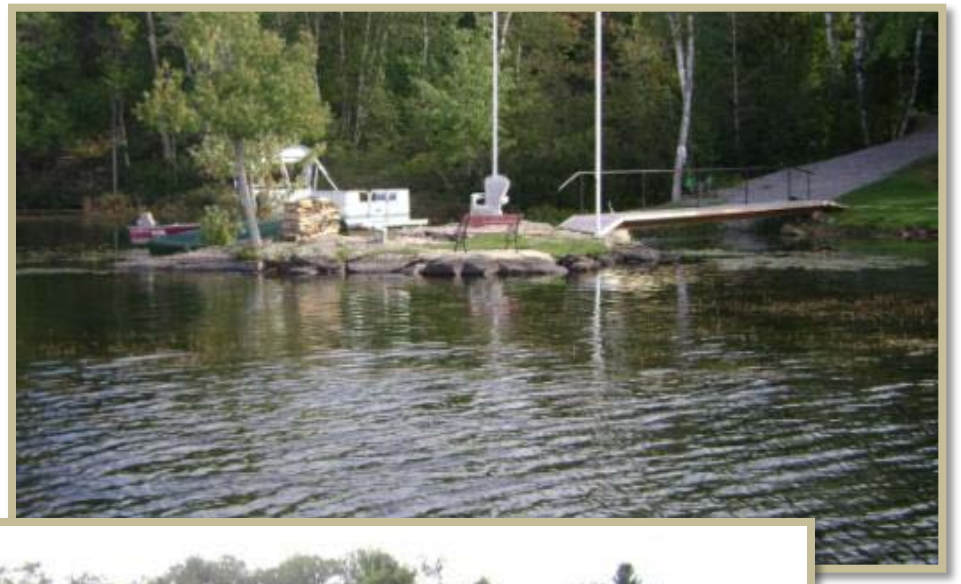
Milfoil Problem

See how it Spreads

Milfoil Problem

Pictures from Big Cedar

BCL – Google Earth View



Milfoil Problem

Long Term Negative Impacts

- Decreased property values
- Boating
- Fishing
- Swimming
- Fish & Wildlife Habitat

Who is EnviroScience?

EnviroScience has the <u>only</u> team in North America experienced in the culture and release of the large numbers of weevils required to affect lake-wide reduction of milfoil

Over 12 years of experience

Have implemented process in nearly 200 lakes in 14 states

In 2005, EnviroScience began work in 2 Canadian provinces

EnviroScience will have a booth at the Spring Cottage Life Show – March 25,26 & 27, 2011

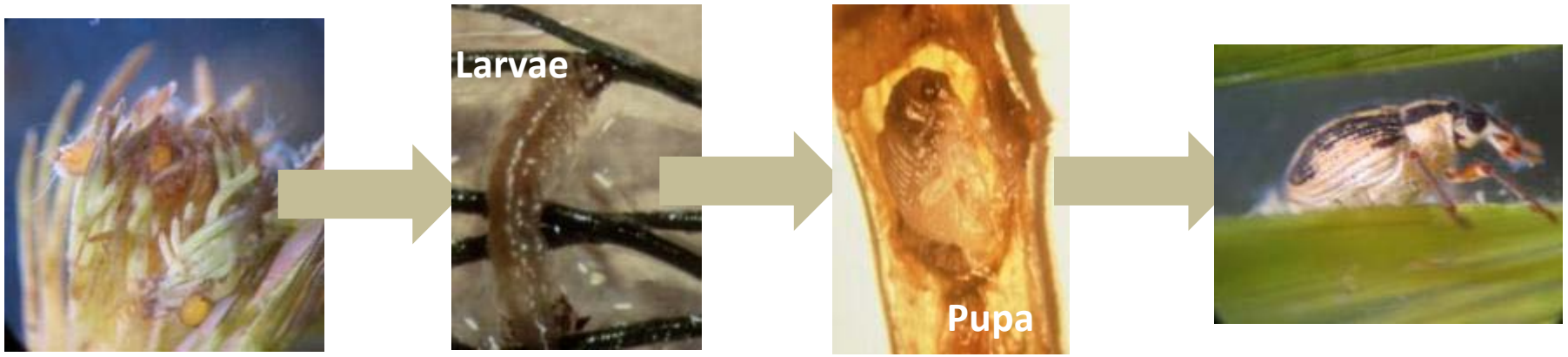
EnviroScience Solution

The “Weevil”... A Long-Term Solution

Microscopic view –
Smaller than a grain of rice!

EnviroScience Solution

The Weevil



Eggs

Weevil Biology

- Native to North America and Big Cedar Lake
- Entirely aquatic, except for hibernation in winter
- Life cycle: 25-30 days
- 3-4 generations per summer
- Larval and pupa stage impacts milfoil the most by tunneling down through the stem of the plant

EnviroScience Solution

What is the Process?

Each year of Program:

May-July

1. Initial survey to determine stocking sites,
   current milfoil and weevil conditions
2. Stock weevils as eggs/larvae

Aug-Sept

3. Follow-up survey to track progress

Sept-Dec

4. Receive Annual Progress Report

EnviroScience Solution

How to maximize success?

- Stocking weevils aggressively in the first years provides faster control
- **Reinforcing the populations over multiple years works best**
- Once established, cottagers experience dramatic lake-wide control
- Regular monitoring after the program is important to long-term success

EnviroScience Solution

Advantages of the Weevil Solution

- Long-term Control, 5+ years
- Cost-effective
- Naturally eco-friendly
- Completely safe for humans, pets
- Encourages plant life diversity
- No water restrictions
- Promotes healthy ecosystems
- Supported by 2 decades of university research and peer-reviewed journals

EnviroScience Milfoil Solution® Approach

- The EnviroScience solution goal is to establish a self sustaining weevil population that keeps the milfoil below nuisance levels.
- Once a self-sustaining population is achieved, management costs drop significantly and only occasional monitoring of the weevil and milfoil levels should be necessary
- Long-term monitoring is an important component for any milfoil management program
- The length of time needed for the weevils to achieve lake-wide control is proportional to the number that are stocked
- Noticeable weevil activity during the first stocking season may be limited and will usually be restricted to the immediate stocking areas. Over the course of the next two to three years the weevils will move from the stocking areas and spread out around the lake, ultimately reaching the density required to control the milfoil within 2 to 5 years.

EnviroScience Assessment of BCL

The Milfoil Solution® for Big Cedar Lake is determined by the extent of the milfoil infestation.

Based on a site visit in September 2010, Rebecca McMenamin, EnviroScience Representative, found Eurasian watermilfoil to be widespread throughout the entire lake with very dense, surfaced mats in shallower bays.

Two indigenous weevils were found during the site visit which means that Big Cedar Lake has the necessary conditions to support weevils. In fact, previous clients' lakes where their biologists have found a natural population seem to experience faster control.

EnviroScience BCL Proposal

Over the last 12 years using a biological control in larger lake systems much like Big Cedar Lake, EnviroScience experience has shown that their clients have the best results when weevils are stocked over 3-4 seasons. Here is an outline of the Big Cedar Lake plan:

- The proposed management plan starts in the spring with surveying the whole lake in order to map the areas with milfoil and determine initial conditions of the plant community . In the same visit, the biologists will stock the initial 30,000 weevils in four concentrated areas (depending on size of infestation) in 2011.
- Then, the biologists will come back at the end of the summer to perform a follow-up survey which will assess the progress within the first year.
- Based on the data collected from the initial and follow-up survey, the biologists will provide a full report of findings to the association and also give recommendations for the subsequent years.

EnviroScience BCL Proposal

- Cottagers who have committed to the whole lake program will be able to purchase additional weevils for their specific lake front if they so desire at a discounted rate offered by EnviroScience.
- A minimum purchase of 2,000 weevils for $1,500 is recommended by EnviroScience
- Additional weevils purchased by individual cottagers will accelerate the success we have on the whole lake program.

Funding Summary

Four year program investment:

Year	2011	2012	2013	2014
Total Cost	$29,000	$29,000	$20,000	$16,150
Scenario 1: Cost Per Cottage with 50 Cottages committed	$580	$580	$400	$323
Scenario 2: Cost Per Cottage with 75 Cottages committed	$387	$387	$267	$215
Scenario 3: Cost Per Cottage with 100 Cottages committed	$290	$290	$200	$162

Note: The cost per cottage depends on the number of cottagers willing to commit to the project. HST is in addition to these cost scenarios.

Funding Summary

- The committee feels it is very important that as many of the 131 cottagers on the lake participate in this program to restore Big Cedar Lake. Until the final number of participating cottages is confirmed we can only estimate the per cottage investment required.
- The committee has done extensive work on looking for external funding. Over 25 different funding opportunities were investigated for possible funding. At present we have one agency with a “high” possibility of funding and two at a “medium”. It is not clear if funding will be available for 2011 due to our timing, but there are strong possibilities for match funding in future years.
- Cottagers should plan to cover the required investment for 2011 and if funding becomes available it can be applied to future years.

Next Steps

- The Committee asks that you read this document including the question and reference sections to fully to understand the EnviroScience Solution for BCL.
- All further questions can be addressed to Brian Stock – bstock58@gmail.com or via telephone at (905) 717-0303
- In order to hit a Spring deadline for project start-up and get a better idea of investment per cottage we need to know who is committed to support this project financially. Please email Darcy Wefers by April 7th – darcy.wefers@sympatico.ca to let her know the maximum level of financial participation you would be willing to commit to the EnviroScience Program.
  If you prefer to call vs. email your support (416) 283-4843
  - Please indicate the Scenario from page 20 that represents your maximum level of financial participation.
- Once we hear from everyone, we will have a better idea of investment per cottage and specific timing.

BCLSA Committee Generated Questions

A series of questions were given to the EnviroScience Group in January of this year. They are listed below in bold with their answers given in plain text:

1. **Two indigenous weevils were found during the site visit, is this the same weevil that EnviroScience would supply?**

   Yes. EnviroScience weevils are the same species as the weevils in Big Cedar Lake.

2. **Can you explain the number of weevils that will be stocked and the number of sites?**

   The report states that five units (1,000 weevils per unit) of weevils are generally stocked per site. EnviroScience recommends 30,000 weevils for 2011, which would equate to 6 sites. They state that in 2011 they would use 30,000 weevils in four concentrated areas. Does that mean there would be six sites within the four concentrated areas? Stocking sites will be chosen in conjunction with you (the board) and our biologists. The board may want to see control in certain areas and as long as there is a large, dense patch of milfoil, we can establish a site. A board member (or couple of members) should be present in order to communicate these desires and also be present to observe how everything works. The stocking sites are chosen during the initial survey of the lake and then stocked with weevils in the same visit. The recommendation of 30,000 weevils means that the lake will potentially have 6 stocking sites, but if one or two of the sites are larger in size, we would recommend allocating more weevils to these areas.

BCLSA Committee Generated Questions

3. **Based on the proposed 95,000 weevils used during 2011 through 2014 this should represent 19 sites. Will the sites be identified during the survey process?**

   Yes. Each year, the stocking sites will be determined by the initial and follow-up surveys and then communicated to you in each year's final report. Based actual progress observed at each site, we will determine if a stocking site needs more weevils OR if no milfoil is found, we will then move on and establish a new stocking site. So as you can see, there will probably be fewer than 19 sites when the program is completed.

4. **What is the natural growth rate of the weevil?**

   The life cycle is anywhere between 28-35 days with 3-4 generations per summer depending on temperature (warmer temperatures encourage faster growth). The larvae and pupae stage do the most damage to the plant because both stages tunnel down through the stem disrupting the plant's ability to transfer nutrients from the root system to the tip of the plant (called the meristem). 3-4 generations per summer means there will be 3-4 cycles over the summer when larvae and pupae damage the plant (while the adults continuously eat the plant all summer long).

5. **What would be the costing for extra individual cottagers weevil programs, assuming those cottagers have committed to the overall lake program?**

   Weevils are only effective when you can stock them in the thousands. We would recommend 2,000 weevils for any individual landowner interested in stocking more weevils in front of the property. We can offer weevils to them at the discounted rate of $1,500.00 for 2,000 weevils.

BCLSA Committee Generated Questions

6. **In the terms of agreement, it says that EnviroSciences workers are protected by Workers' Compensation. Is this the Canadian Workers Compensation?**

   Ohio has a state-funded worker's compensation program that covers ES employees wherever we work, no matter the state or county. We can provide an insurance certificate for comprehensive liability insurance and professional liability insurance (errors and omissions) upon request.

7. **This proposal may be considered proprietary information by EnviroScience and we should seek their permission prior to posting it publicly (e.g., on a blog site or website)?**

   Thank you very much for asking. The board is welcome to post the proposal. If we enter into a contract, the reports written each year are considered yours and thus, your decision if you want to share. Most of our clients who have websites do share reports and proposals this way.

BCLSA Committee Generated Questions

8. **How frequently will monitoring take place? Once a year? Every second year? Every five years?**

   We recommend having a survey the year after the final program survey, and then every other year following. In order to protect your investment in milfoil weevils and ensure long-term control of Eurasian watermilfoil, we recommend our Milfoil Solution® Maintenance Survey. We offer this survey to our previous clients at low cost because we understand the value of continued monitoring in any milfoil management strategy. Tracking changes in milfoil density and the weevil population can identify potential problem areas early. This allows for a rapid, cost-effective response and prevents new resurgences from becoming much larger problems. You will save money and extend the life of your management program if you monitor it regularly.

   We estimate the survey to be about $1,750. I can provide additional details (including methods and reporting) about the survey upon request.

9. **What percentage of your projects require significant adjustment(s) to the original proposal. In cases where significant adjustments are required, what is the typical total impact to the overall budget? Please give specific example(s).**

   Rarely have lakes ever required more weevils than initially proposed. However, an early spring, high temperatures, or some other unusual environmental variation can cause a strong

BCLSA Committee Generated Questions

surge in milfoil growth. If this occurs during the first or second year of a program, and the lake association is concerned, we can increase the number of weevils for the next year, if desired. This occurred last year on Long Lake in Hale, Michigan, a highly populated and heavily recreated lake in northern Michigan. High expectations on the part of some lake residents for more progress in the first year and a huge milfoil surge at the end of the first season developed into an increase in the number of weevils stocked in year two. This was of course dependent on available funding on their part. Conversely, we have had a situation with a client lake that did not need as many weevils as proposed in the third year of the program. Eagle Lake, Michigan, received a proposal from us for a three-year program with 15,000 weevils in the first year, 10,000 weevils in the second year, and 8,000 weevils in the third year. By the third year, the lake's milfoil was largely gone, except for one small area, so we recommended only stocking 3,000 weevils that year. Attached is a short white paper detailing Eagle Lake's project. Our Eagle Lake contact, Dr. Chuck Cubbage, is on the reference list that I previously provided.

Our clients experience the best results when weevil populations are reinforced over multiple years, which accounts for any seasonal variability. We recommend what we know works and will adapt the program each year based on actual progress. EnviroScience places honesty and integrity at the foremost importance as well as keeping our clients happy.

Frequently Asked Questions
- taken from the EnviroScience website

1. **Would we be infesting our lake with an exotic species?** No. The weevils are native to Canada and the United States. Its original host plant is a native species called Northern watermilfoil; however, weevils prefer this plant's exotic species, Eurasian watermilfoil. In fact, our biologists find indigenous populations of weevils in most lakes, so there is a high possibility that weevils are already living in your water body on these milfoils.

2. **How were weevils discovered?** Dr. Sallie Sheldon of Middlebury College in Vermont discovered that this little aquatic beetle was responsible for milfoil control in one of the university ponds. After 10 years of research, a program for the biological control was developed and proved very effective in extensive field trials. Since 1998, EnviroScience has continued large-scale stocking projects and has achieved success in nearly 200 lakes across the Northern United States and Canada. In addition, EnviroScience supports two graduate students at Michigan State and the University of Akron and donates weevils to the Trent Severn University in Ontario to further research on weevils.

3. **If I already have weevils, why do I need to add more?** The native population is usually at a level too low to keep up with the rapidly growing milfoil- the milfoil can grow up to an inch a day! Also, the weevils are only the size of a sesame seed and at such low levels, cannot find each other easily. By augmenting the population, the weevils are able to achieve higher numbers more quickly when they can easily find mates.

Frequently Asked Questions
- taken from the EnviroScience website, continued

4. **What is defined as long-term control of milfoil?** Milfoil can never be eradicated from a water body once introduced, not even with herbicides or harvesting. However, as the natural predator of milfoil, weevils will return every spring and spread around the lake in search of more food (milfoil) . Visible signs of long-term control are the increase in native plant species, decrease in abundance of milfoil, and maintenance of any remaining stems below the lake surface at a non-nuisance level.

5. **Does someone need to come out to visit the lake before the stocking?** No. We only need to positively identify that you indeed have Eurasian watermilfoil and that there are dense milfoil areas for stocking weevils. Our biologists can determine stocking locations when they bring the weevils. However, if you have a recent vegetation survey map, it will help us design a more precise proposal.

6. **How many weevils are needed per acre of milfoil**? The goal for all **Milfoil Solution®** programs is to establish a self-sustaining weevil population that keeps milfoil below nuisance levels. Each ecosystem responds differently, so weevils are not stocked on a per acre basis. Instead, weevils are stocked based on the size of the infestation. Once a self-sustaining population is achieved, management costs drop significantly and only occasional monitoring of the weevil and milfoil levels should be necessary. Long-term monitoring is an important component for any milfoil management program and should be considered when deciding on a management strategy. Herbicide applicators monitor milfoil levels every couple of years when they return to reapply chemicals. EnviroScience Inc. offers the **Milfoil Solution Maintenance (MSM) Survey®** as a low cost service that tracks weevil and milfoil populations and protects your investment in weevils.

Frequently Asked Questions

- taken from the EnviroScience website, continued

7. **How long will it take to achieve lake-wide milfoil control?** Many factors play a role in determining the time needed for control, including lake size, quantity and density of the milfoil, and the number of weevils stocked. However, in most stocked Michigan lakes, lake-wide control (not eradication) has been achieved in one to four years.

8. **Will the weevils become a nuisance? Specifically, do they bite or swarm homes in the fall**? No, they remain on the plants in the water until some adults go to shore in late fall to spend the winter in the soil. The weevils are specific to only some watermilfoil species and prefer Eurasian watermilfoil over the native Northern watermilfoil. They are also highly effective at controlling the hybrid cross of these two species.

9. **What time of the year is best for stocking?** Mid-May through early August is best. Stocking weevils by midsummer allows several generations to establish before overwintering.

10. **When the levels of the Eurasian watermilfoil weed collapse because of predation by the weevils, what will the weevils eat then? The** weevil population in the lake will decrease naturally as the quantity of its food decreases. Even when the milfoil decreases, the weevil population sustains at a low level and remains poised to increase should conditions favor milfoil growth. It can take a season for the weevils to catch up and begin controlling the resurgence. One of the best ways to stay in tune with the weevils after a program ends is through our Milfoil Solution® Maintenance Survey.

11. **Does fish predation affect weevils?** No. They are not a preferred food choice and only incidentally found in the stomachs of bluegills. In 2006 EnviroScience did a large study in New York and an independent consultant did a similar study in 2007 where we looked at gut contents of sunfish in weevil stocking areas. In both studies, very few weevils were found in the guts of these fish, indicating that predation levels are very low. In addition, bluegills are present in the lakes in which our program has been very successful.

References

Lake Puslinch (Cambridge, On)
2007 vs. 2008

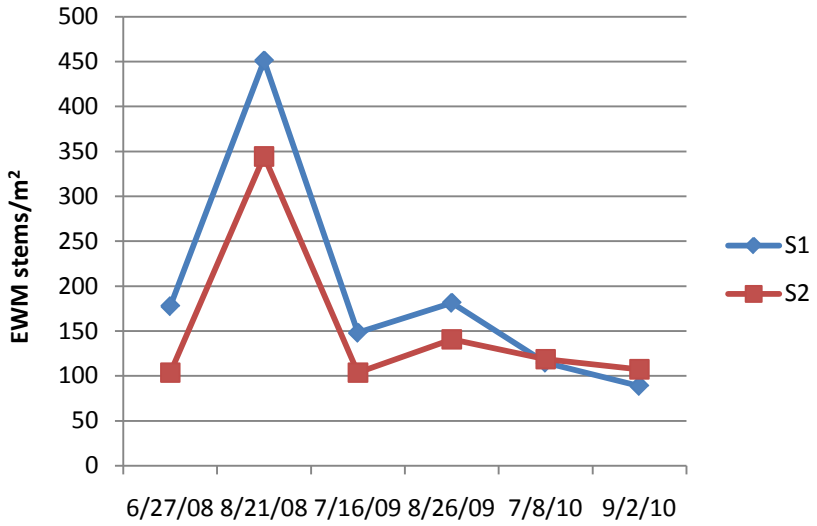
References

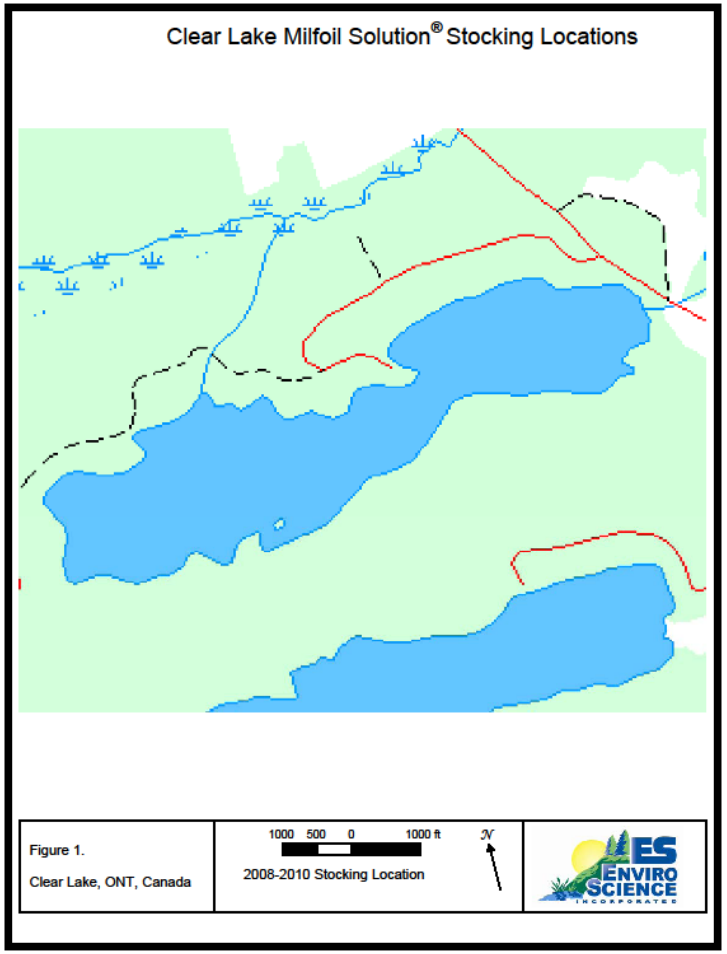
Clear Lake (Espanola, On)
2008-2010

Summary

36,000 weevils total in 2 sites over three years

Milfoil density decreased by 80% in S1 and 70% in S2





References

Lake Scugog (Port Perry, On)

"As president of the Scugog Lake Stewards, a 17,000 acre lake in Southern Ontario, my experience with milfoil weevils and EnviroScience Inc. has been extremely positive. *Our early results indicate that the weevils are off to a strong start, and all of the EnviroScience staff are both knowledgeable and an absolute pleasure to work with. I believe that weevils hold a great* deal of promise for the many large Ontario lakes and waterways dealing with both Eurasian watermilfoil and its recently identified hybrid with native Northern watermilfoil."

- Jamie Ross, June 2010

More References

- The following is the website of the Bonaparte Conservation Club, which contains a documentation of their experiences of using weevils to combat the infestation of Eurasian water milfoil in Lake Bonaparte situated in Harrisville NY from 2002 to 2009. http://www.lake-bonaparte.org/milfoil2.h

- Kent Simmons wrote the "Aquatic Ecology Help Pages" for high school and elementary teachers of the Winnipeg region. The following website is from the section of evasive species particularly Eurasian water milfoil. In this section the author indicates that the weevil is viable as a biological control for milfoil. http://kentsimmons.uwinnipeg.ca/ysesp/exotic4.htm

- Scugog Lake Stewards Inc. prepared a "Report on the use of Milfoil Weevils". They are convinced that it is the best solution for their lake. http://74.205.99.190/cms/content/ARN-2YX/binary/article/attachment/AT1-L9/normal

- University of Minnesota, Department of Fisheries and Wildlife. http://fwcb.cfans.umn.edu/research/milfoil/milfoilbc/weevil.html

Related Links

EnviroScience

http://www.enviroscienceinc.com

Info on Milfoil Weevils

http://www.enviroscienceinc.com/lake-management/41-lake-management-milfoil-solution/36-milfoil-weevil

Newspaper Articles

"Hungry weevils gobble up weeds" (April 19, 2010)

– http://www.newsdurhamregion.com/life/beinggreen/article/160220

"Scugog Lake Stewards reel in funding for weevil pilot project" (June 3, 1009)

http://newsdurhamregion.com/articlePrint/127614

Info on Invasive Aquatic Plants

MNR's "Field Guide to Aquatic Invasive Species" (Eurasian Milfoil on pages 25-26)

http://www.invadingspecies.com/GetFile.cfm?ID=27868_FieldGuide2010_FINAL.pdf

Ontario Federation of Anglers and Hunters – Invasive Species Awareness Program

http://www.invadingspecies.com/

Info on Controlling Aquatic Plants

– DFO's "Fish Habitat and Controlling Aquatic Plants" (Ontario fact sheet)

– http://www.dfo-mpo.gc.ca/regions/central/pub/factsheets-feuilletsinfos-on/i2-eng.htm

Related Links - continued

Info on Controlling Aquatic Plants - continued

- Kawartha Lake Stewards Association – "Aquatic Plants Guide" (see PDF page 12-15)
  http://www.lakefieldherald.com/KLSA/Plant_Guide_web.pdf
- Otonobee Conservation Authority "Lakeland Living Guide" (see PDF pages 12-15)
  http://www.otonabee.com/download/Lakeland%20Living%20Guide%20final1.pdf

Stewardship Organizations

- Greater Sudbury Watershed Alliance
  https://sites.google.com/site/sudburywatershed/
- Kawartha Lake Stewards Association
  http://klsa.wordpress.com/
- Peterborough County Stewardship Council
  http://www.ontariostewardship.org/councils/peterborough/
- Scugog Lake Stewards
  http://www.scugoglakestewards.com/stewards.php

Other Useful Information

- Lakeland Alliance's "Best 1st Call" (when planning to work around the water)
  http://www.lakeland.greenup.on.ca/workaroundwater/documents/BestFirstCall_Final.pdf
- Sturgeon Lake Management Plan
  http://www.kawarthaconservation.com/sturgeonlake/index.html