

Research Grant Application  
Barnstead Milfoil Committee  
2007-2008

**07-08 Suncook River Milfoil Removal Study**

**A. Brief Description:**

The Barnstead Milfoil Committee, Center Barnstead, NH is submitting a proposal to the NH Department of Environmental Services to develop a procedure and study the results for removing milfoil that has infested a large section of Suncook River in Barnstead. Developing a workable methodology will provide a large benefit to controlling the spread of variable water milfoil (*Myriophyllum heterophyllum*) in other rivers in NH. There is no report the Committee is aware of that demonstrates successful removal of milfoil from an active flowing river.

This study is the third of a five-year program to remove a significant milfoil infestation from a major waterway that incorporates two lakes and one pond that are saturated with milfoil. This water way joins the Suncook River about 1 mile below the Lower Suncook Lake that was successfully treated in 2004. Using the STOP Milfoil integrated program plan, all milfoil was removed from this lake. A similar comprehensive plan is being used to demonstrate that variable water milfoil can be removed not only from the river but all waterways feeding the river.

**B. Introduction:**

Summer 2005:

Variable Milfoil infestation of the Suncook River in Barnstead NH has been steadily increasing during the past 5 years. During the past 5 years the infestation dramatically increased to cover about 80-90% of the river. Barnstead Milfoil Committee received money from the Town of Barnstead to test a method for removing variable milfoil from the river using 2, 4-D herbicide, and perform tests to record herbicide movement in the river. The results of the treatment showed that early September treatment was effective in killing milfoil but the surviving patches were in heavy silted areas. The use of curtains was not practical for future efforts.

Summer 2006:

A river test drop was done in early fall in preparation for a herbicide treatment for early summer '07. The concept was to create shallow areas that would be treated and force the water currents to recede back to the main channel area. At each 2 foot level, the reduction was found to significantly reduce water currents in the shallow areas. Each level remained constant for 5 days to plan for good herbicide take up.

Part of the test drop was to determine necessary data to help match inflow with out flow. A second reason was to reduce the amount of plant matter in the river by killing off the existing

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stalks. The early '07 treatment schedule is to treat the area before the stalks can re-grow to significant size. A third part of the test drop was to do a GPS mapping of the channel and determine if central channel had changed during the major 100 year flood that occurred after the original survey. The river was left in its lowest state for the remainder of September to ensure milfoil defoliation. A list of accomplishments is documented in the '06 program report.

Summer 2007:

The first treatment occurred May 2. The river was lowered in steps to force any current back into the channel after 5 day lapse. Drogue studies by UNH confirmed that little or no current existed in the treatment areas. The four treatment levels were at minus 1.5 feet, minus 3 feet, minus 5 feet and minus 8 feet. Treatment was completed by June 5<sup>th</sup>. Two early summer storms and a high water table prevented the water level from getting below four feet when the target was to get down to minus five feet.

A liquid (DMA) amine 2, 4-D with surfactant was sprayed onto the plants after the river bank was exposed to air when the river level was below the intended treatment area in order to compare this product with Navigate. Rain immediately after treatment caused this test comparison to be ineffective.

The result of the treatment provided a complete map of the Suncook River that had high silt and heavy silted areas by the location where re-growth was found. The initial treatment covered about 90 plus acres. A follow up treatment was not permitted. The amount of survival showed the importance of planning for one or two follow up treatments. The surviving plants amounted to about 40 acres and grew in patches in the Broads and along parts of the river to the dam and in both major coves.

**C. Objectives/program:**

The '07-'08 objective is to develop a plan that will lead to improved understanding of the best methods for using herbicide treatment for variable water milfoil in locations that have high or heavy silted bottoms in water bodies with minimum current flow. The secondary objective is to significantly reduce the milfoil infestation on the Suncook River and watershed water bodies so that divers can manage and eventually remove any surviving and new plants.

The treatment process is planned to compare multiple sites that are treated with a single dose at 100 lbs/acre with sites treated with a double dose at 200 lbs/acre. Many of the factors that can affect the performance of the herbicide will be measured and plotted during the primary treatment and up to two follow up treatments. Divers are also planned to systematically remove surviving plants, measure silt depth, root length and crown mass. A sun block barrier is planned to assist diver effort by stunting the growth of milfoil in areas that are downstream of and weeks away from diver attention. A SAS Design of Experiments will be performed on the data to sort out the critical factors that affect the herbicide effectiveness. The UNH

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Cooperative Extension will provide the man power and analysis for weekly observations of treatment areas as well as measuring water column herbicide concentrations.

The benefit to the community and State of NH is great. Being able to clean up infested rivers is critical to timely and effective management of milfoil in NH water ways for the foreseeable future. Management of milfoil will prevent loss of shore front property value, and keep NH Lakes and the rivers feeding these lakes attractive and a viable source for recreation of NH citizens and out of state vacationers. Eliminating milfoil also protects the natural habitat and natural vegetation that exists in the waterways which in turn protect and enhance all fish stock and fishing activity.

**D. Project Narrative:**

Treatment overview:

Observations made during herbicide treatments over the past few years at Lower Suncook Lake and Suncook River indicate that effectiveness is hampered by the depth of silt at the plant location. Discussions with experts working for the treatment company confirm this observation and even indicate that this phenomenon occurs with other exotic plant treatments as well. During the past several years, it has been observed that there are multiple periods almost monthly when the water flow is very low. All herbicide treatments are planned to occur during minimum flow instead of trying to lower the river per the 2007 treatment plan when the water table prevented complete control.

In order to determine the best methodology for herbicide treatment, a dose comparison study is planned for the 2008 Suncook River milfoil treatment program. The comparison will be done using the DOX statistical Design of Experiments analysis to setup the sites, apply proper contrasts to the factors in the study, and make appropriate observations and water column measurements. Multiple sites are scheduled for either single (100 lbs/acre) dose treatments or double (200 lbs/acre) treatments for the initial treatment scheduled in late June. Planned follow up treatments are one single dose in the double dose areas and 1 dose in most and two doses in some of the single treatment areas. The follow up treatments are to be applied after new plants have reached about 1 foot in size in order to locate all surviving root structures and have them capable of absorbing a maximum amount of the herbicide.

Divers will begin removing milfoil patches in non-treated areas that are in the area just north of the dam in June. Later in July, they may be used to remove any plants found in non-treated areas, particularly the Broads. The water samples will help establish herbicide concentrations as a guide for their safety. By August, they will be focusing on major areas starting at the northern most cove, Crooked Run assuming it will not need a second follow up treatment.

In September, divers will start work on any plants that survived the three treatment attack. More than likely, a sun barrier film will be required to act as a sun block for some of the treatment areas. The sun block will help reduce the amount of growth in the surviving

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plants and keep their size more manageable for when the divers can get to attack that site. We may need to continue the use of the film block in '09 in order to give the divers a chance to remove any further growth that occurred after the water turned colder in October. The divers will also provide information about root length and crown mass density for each treated site. They will also gather silt depth information and confirm the density of the plants in the treatment sites. All of this information will be included in the analysis.

The UNH Cooperative Extension will be providing the expertise and student labor to gather and analyze 20-22 field samples taken each week. Students will also provide the resources to perform the following information and work requirements:

1. Gather the observations and water samples each week over a period from June 1 (if possible) to September 30 (if possible). That is about 18 weeks at 20 hours per week. I am thinking that would be a combination of 3 days per week at about 7 hours per day, or 4 days per week at 5 hours per day.
2. Treatment is planned for the last week in June, July and August. The July and August treatments are follow up of areas that re-growth is being observed.
3. We will have 20 water sample sites each week and will determine the time period. We should get one at the 3 or 4 day after the first dose scheduled for the last week in June. Then at the 8, 15, 21 and 30 days after each dose.
4. During the month of June, the students will be needed to visually locate all of the milfoil patches and put floating markers out to denote the limits. These will be simply string poly floats chopped into 6" sections, tied with fish line and weighted on the bottom. Most will be in 3-5 feet of water.
5. During the months of July, they will need to kayak and canoe around and look for any re-growth, measure water flow rates in specific areas, take water column samples, determine if any milfoil is growing in non-treated areas, and ultimately really understand what is happening under the water.
6. In September, divers will start work on any plants that survived the three treatment attack. More than likely, we may need to install some sun barrier film on the water surface. The students can be a big help starting that job and helping remove it after the divers have stopped for the year. Part of this job will be to set up wildlife barriers and perform any other tasks as required by the Wetlands Bureau permit.
7. Students will be required to assist the diver program and provide help in emptying the milfoil bags so the diver can remain in the water. Generally, a large raft will provide the platform to do this job, but for some small removing requirements, kayaks and canoes will work fine.
8. The students will record the following information that will be used in the analysis: date of observation, site location, treatment #, treatment lapse time, water flow, plant density, water depth, water body, re-growth time, and from the divers are root length,

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crown mass, silt depth, plant density prior to treatment and % plant kill after treatment.

SAS JMP analysis will be performed periodically during the summer to help identify significant factors and contrasts to assist with future record recording and observations. The final analysis will be to determine those factors that enhance the effectiveness of the herbicide and the conditions required by these factors. Also, the analysis will determine those factors and treatment conditions that degrade the herbicide effectiveness for variable water milfoil treatment.

Members of the Barnstead Milfoil Committee will provide assistance to the students and will oversee the program to ensure that tasks are being completed on schedule and in an effective manner.

**E. Project Team:**

- Barnstead Milfoil Control Committee (BMC)

There are a total of 8 active members on the BMC, all-contributing to the effort and management of the project. They are listed along with their positions in the program as follows:

Ed Neister – Chairman: Ed is also the current chairman of the Suncook Lake Milfoil Control Committee and has been responsible for developing new treatment procedures and methods used on the Lower Suncook Lake to eradicate milfoil in that water body. He is helping to develop new techniques to demonstrate that variable water milfoil can also be eradicated from river impoundments like the Suncook River and the entire Suncook River watershed.

Jim Fougere – Assistant Chairman: Jim Fougere joined the Milfoil Committee as Chairman of the Barnstead Conservation Commission and as a representative of the Planning Board. In addition to his local experience, Mr. Fougere has over twenty-five years in resource management throughout New England as well as North and South Dakota. He is currently employed by Schauer Environmental Consultants, LLC, as a Wetland Scientist and Wildlife Biologist and is a Certified Wetland Scientist (#161) and is certified in Habitat Evaluation Procedures (USFWS).

Pam Miller – Survey Specialist: Pam works for Curry Realtors in Alton and is well versed in property locations and their values in and around the Suncook River watershed. She knows the area well and fishes the Suncook River and most of the lakes in Barnstead.

Dave Juvet – Information Officer and activity recorder: Dave is vice president with the Business & Industry Association, New Hampshire's state chamber of commerce and has 25 years experience lobbying on issues relating to business development, including transportation issues, workforce development and business taxation. He has a bachelor's

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degree in History from Arizona State University, and serves on the boards of the New Hampshire Workforce Opportunity Council and the New Hampshire Travel Council.

Suzanne Picone – Quality Assurance: Suzanne has a B.A. in Environmental Science graduating from Franklin Pierce College in 2004. Her concentration in biology and plants puts her in a critical position to help with the clean up of the Suncook River Watershed.

Brian White – Dive Master: Brian has spent years assisting in the hand pulling of milfoil in the Lower and Upper Suncook Lake. He has made a unique barge that provides an ideal platform for dive surveys of the Suncook River and the other lakes in the Suncook Watershed.

Dot Wenblad –Dot is a retired teacher living in Barnstead and seen the steady decline in the quality of the Suncook River watershed.

Jeff Crary – Map support: Jeff operates Crary Waterfalls and Aquatic nursery in Center Barnstead. The company installs water gardens and grows water plants for customers in NH and surrounding area. He has lived in town for 20+ years.

- UNH Cooperative Extension; Center for Freshwater Biology

Professor Haney's group will perform the water analysis before and after treatment, and will advise MCC about each analysis. The UNH CFB will be responsible for overseeing the sampling of the river for detection of levels of 2,4,D acid in the water samples. Samples will be run in the CFB analytical laboratory according to established protocols (EPA SW-846 Method 4015- Immunoassay Method). We estimate that for the proposed sampling schedule requested by the Barnstead Milfoil Control Committee 18 sample analysis runs with a range of 22 field samples on each run will be required. For each run we will include a set of calibration standards, a control, two blanks and a spiked sample along with the sample set. The CFB will provide all sample collection containers and maintain the chain of custody for each sampling date.

All laboratory results and field measurement will be reported back to the MCC in a timely manner following the study.

## **F. Project Tasks:**

The summary of each task is described here.

1. Winter Planning: The data taken after the '07 treatment was used to prepare contour maps and treatment areas so that the amounts of herbicide required could be determined. Treatment protocols and methods of application with location and overall program objectives were also developed and written.

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2. Treatment Preparation: Treatment will follow as close as possible to the schedule with Aquatic Control Technology performing the treatments per the program. Preparation included the gathering of abutter information, determining critical distances and locations to the treatment areas, setting up notification procedures and identifying resources to accomplish all of the tasks.

3. Summer Treatment: Multiple trips will be required to understand the effectiveness of the different herbicide treatments and relate them to specific locations and ground conditions. Important to the observation is to determine how many plants survived the treatment and the significance of the double dose compared to the single dose for high and heavy silted areas.

4. Post Treatment: A complete review will be done of the Suncook River impoundment using observers in boats, canoes and kayaks to determine if any plants survived and note their location. Divers will support the treatment program and will observe at depths of 8 feet and lower whether milfoil exists at this depth of the river. The program incorporates a dive team consisting of the master diver who is on the MCC and amateur divers that are certified by the WCD program or have been pulling milfoil in the Lower Suncook to pull any remaining plants and to check such sites for the duration of the program.

5. UNH Research: UNH Cooperative extension will provide the resources to take samples at critical locations on the river during the treatment period to confirm herbicide concentrations in the water column of most of the treatment areas and perform all other tasks as outlined in the program.

6. Final Report: A final report will contain a compilation of all the data, reports from each task, a discussion about each herbicides effectiveness and observations concerning kill effectiveness at all of the different depths of the river.