

Northeast Aquatic Research

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September 23, 2009

Crystal Lake Association

RE: Post Suction Harvesting Distribution of Variable-leaved Milfoil in Crystal Lake.

Dear Sirs:

On September 8, 2009, I conducted a post suction harvesting survey of the Crystal Lake milfoil beds to determine how affective the operation was at removing variable-leaved milfoil from the lake. During that survey, I looked at the areas presented in the July 1, 2009 report. This included the north end of the lake, the northeastern area and the south area. I looked briefly at the area between the sand bar and the lake outlet, but I did not go into the wetland coves, Aborn Brook Cove or Northeast Cove.

Overall I found very little variable-leaved milfoil in the lake. In almost all areas, the bottom was completely devoid of variable-leaved milfoil. All high and medium density plants beds were completely gone. The beds between the sand bar and the dam were reduced from high density to medium density beds. The low density beds were reduced to very low density coverage. The initial designation of Low Density was defined as plants scattered over the bottom with varying coverage of small plants of about 12 to 18 inch single shoots occurring about once in 10 to 20 square feet, or less. The very low density designation is defined as occasional short shoots typically between 6 and 12 inches in length that lay on the bottom but perhaps one in 100 to 1,000 square feet or less. Essentially all of the mapped plant beds shown in July 1, 2009 report have been reduced to very low density beds. This implies that plants can be found if looked for in any of the areas where plants existed previously but that the plants will be found widely scattered and only as short individuals or small clumps. The designation of very low density indicates that variable-leaved milfoil is still present in the lake but at such a low level of occurrence as to make it scarce.

Between the sand bar and the dam, the milfoil was present at moderate density. I did not get to thoroughly look through this area because the water level was down by about a foot making it too shallow to access, but it appeared that most of the high density beds had been reduced to medium density beds.

I have attached a map that shows where I found occasional small single shoots laying on the bottom, or small clumps of a few shoots. Very rarely, I saw clumps of a few short plants the ones I found are noted on the map. These shoots and short plants had lengths of between 6 to 24 inches in length. I expected that some of these plants would remain in the lake after the operation was completed. The short shoots are easily hidden by suspended sediments while divers are in the water.

It is difficult to quantify the total percent of the plant that was removed during suction harvesting because the plant was not volumetrically assessed prior to harvesting. However, based on the complete removal of all shoots greater than about 24 inches and the nearly complete removal of shoots of 24 inches and less, it is probable that the biomass of milfoil remaining in the lake is in the order of 1 % of what was there prior to harvesting. The plants in the high density beds had been determined to be large multi-stemmed clumps of between 1 and 3 feet in diameter at the sediment surface. These clumps consisted of between 30 and 60 stems each about 5 – 8 feet long. These clumps were arranged roughly 10 feet apart giving a general density of about 280 clumps per acre. However, each clump consisted of between 150 and 480 feet of shoot material that could spread out in an arching canopy extending several feet around each central stem base. Accounting for the linear length of milfoil shoots would mean that each acre of milfoil contained between 42,000 and 134,400 feet of shoot material per acre.

The medium density beds contained less plant material with each clump containing fewer stems and of shorter length. Typical densities were 10 clumps for each 100 square feet or roughly 45 / acre. The plants were smaller with fewer, shorter stems, between 10 – 20 stems of between 2 and 4 feet long. This would mean that there was between 900 and 3,600 feet of milfoil shoot material per acre.

Comparing the total lengths of shoots present prior to the harvesting against the few short, 12 to 24 inch shoots present now demonstrates how much material was removed. If 100 shoots of 12 inch length remain in the lake that would be a removal of 99.9 %.

Post survey totals for each category are:

High Density	= 0 acres	These beds are gone
Medium Density	= 1.4 acres	This is the bed between the sand bar and the dam
<u>Low Density</u>	<u>= 0 acres</u>	
Total	= 1.4 acres	

This does not include plant coverage in the Southeast Cove at Aborn Brook or plants in the Northeast Cove.

The plant has now been reduced to a manageable level of occurrence, that is, there is very little milfoil presence remaining in the lake. An active surveillance and diver hand-pulling program should be sufficient to maintain control over the milfoil growth into the future. The plant still exists in both coves, between the sand bar and dam and in the small detention pond across Route 140. Also small plants are scattered around the lake. These will grow if left alone, and new plants can enter the lake from any of the four areas where tall plants remain, that is the coves, the pond, and the dam area. Further harvesting operations would be warranted between the sand bar and dam, but plants in that area that are crowded along the shore may be controlled using bottom barrier. Plants in the pond across Route 140 should be removed and the small stream that connects the pond to the lake should be cleaned of milfoil. Each of the coves should be cleaned of plants but these

areas may be more difficult to harvest, especially the northeast cove. If milfoil remains in the coves at least boating lanes should be opened to prevent fragmentation and re-infestation of the lake from boats that pass through the beds in these areas.

Milfoil management in the future should be an activity conducted annually by residents. Surveys should be made using underwater camera and surface viewing at least twice a year. Plants that are found can be marked using GPS or removed immediately by readied divers. I suggest keeping a log of actions conducted each year that would include locations and type of plants that are removed. In addition, because all tall plants have been removed from the lake the occurrence of floating shoots should be dramatically decreased. Floating shoots found on the lake surface should be removed by those who see them. This information should be passed on to people using the lake. If the presence of floating shoots does not decrease than the source of the shoots should be actively pursued.

If I can be of any further assistance please let me know.

George W. Knoecklein

Post Suction Harvesting Distribution of Variable-leaved Milfoil. Survey Date 9-8-09.

