

**Site Assessment Summary of Diver Hand Removal and
Chemical Application to Eliminate Eurasian Water Milfoil
(*Myriophyllum spicatum*) from the St. Croix Flowage at the Gordon
Dam County Park Boat Launch -August and September, 2007**



(Koshere, 2007)



(Koshere, 2007)

Project Initiated by:

St. Croix Flowage Lake Association, Douglas County Forestry Department, and
the Wisconsin Department of Natural Resources



(Koshere, 2007)



(Koshere, 2007)

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INTRODUCTION:

During the summer of 2007, a St. Croix Flowage Lake Association “Clean Boats/Clean Waters” Monitor discovered the presence of Eurasian water milfoil (*Myriophyllum spicatum*), an aquatic invasive species, at the St. Croix Flowage Boat Launch at the Gordon Dam County Park approximately 7 miles west of Gordon/HWY 53 on CTH Y (N46.25392 W91.92518 NAD83) (Figure 1). A follow-up point intercept survey failed to locate Eurasian water milfoil at any other locations on the flowage, but Wisconsin Department of Natural Resources/National Park Service Biologists did locate a small number of plants on the south shore directly downstream from the spillway on the St. Croix National Scenic Riverway.

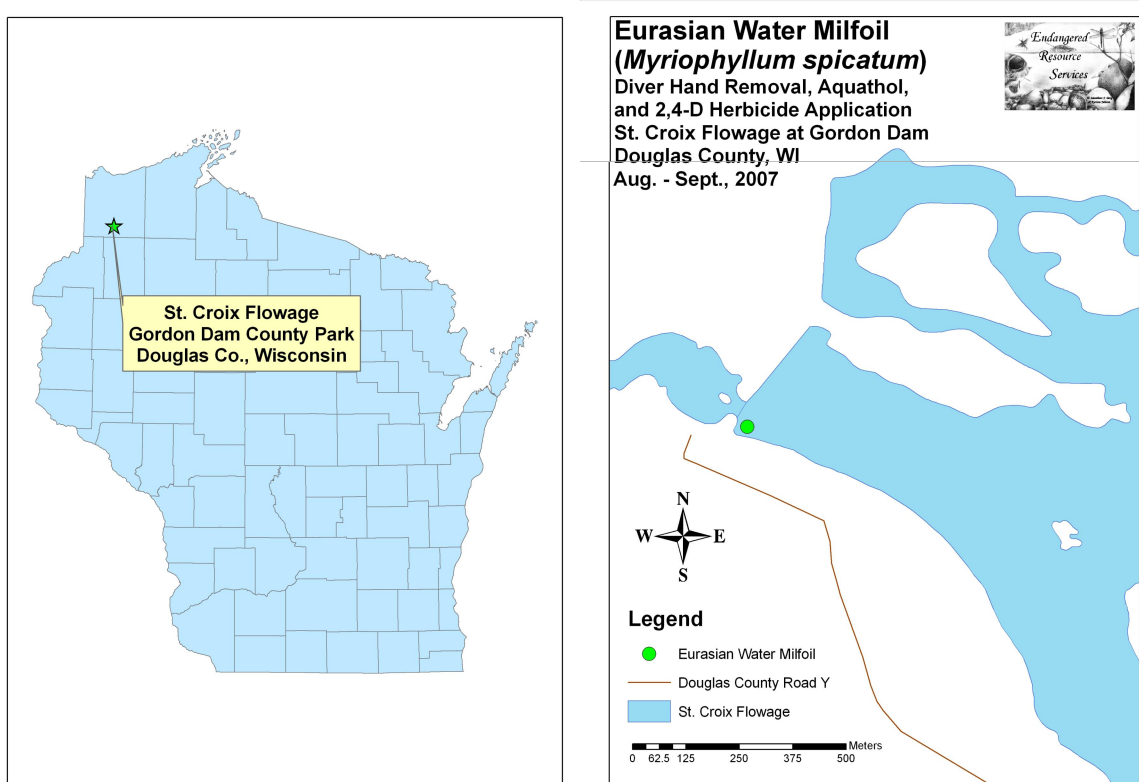


Figure 1: St. Croix Flowage, Douglas Co., WI

Based on this information, the St. Croix Flowage Lake Association, the Douglas County Forestry Department, and the Wisconsin Department of Natural Resources authorized a three point control effort utilizing manual removal and a two step chemical application. This report represents a summary of those efforts as well as initial follow-up observations on the effectiveness of these control methods.

METHODS:

Manual Removal of Eurasian Water Milfoil Above the Dam:

On August 16, 2007, we conducted an initial rapid survey of the known EWM area using SCUBA gear and underwater scooters to assess whether divers could effectively and safely work in the area. We also delineated the perimeters of the known infestation near the landing. Following our initial assessment and discussion with on-site WDNR and lake association representatives, they determined that SCUBA and manual removal were suitable control options. Starting from shore, we swam transects parallel to the shoreline in the established area of infestation until we reached the edge of the littoral zone in approximately 12-14ft of water. Once we visually located Eurasian water milfoil plants, we gently extracted the root crowns from the sediment, wound the plants around our hands (many were 12ft in length), and carefully inserted the mass into 30in.X18in. drawstring cloth bags. We made every effort to prevent leaflet fragmentation which could lead to plant dispersal and vegetative propagation. Volunteers from the lake association assisted us in this effort by netting any fragments that were accidentally dislodged from the main plants and subsequently floated to the surface.

Aquathol Super K Application:

Frank Koshere (2007) related that Dale Dressel of Northern Aquatic Services used a boat mounted broadcast spreader to apply granular Aquathol Super K in sequential doses of 2ppm, 1ppm, 1ppm and 1ppm at 12 hour intervals over an approximately 2/3 acre area extending from the boat landing dock on the southeast shore diagonally northeast to the riprap rock wall located directly to the south of the dam on August 29-30, 2007. The reported water temperature at the initial dose was 22°C.

Manual Removal of Eurasian Water Milfoil Below the Dam:

NPS and WDNR biologists conducted a canoe survey from the Gordon Dam to Dry Landing to locate and document additional areas of infestation. Plant locations, and densities were recorded. Following the survey, WDNR personnel and citizen volunteers were recruited to manually remove EWM at all known locations below the dam.

Follow-up Swim Over Assessment of Initial EWM Control Measures:

Following diver hand removal and application of Aquathol Super K, we conducted a swimover survey of the chemical application area on September 30, 2007. The primary objective of our visual assessment within and adjacent to the application zone was to determine the impact of treatment on the target species Eurasian water milfoil (*Myriophyllum spicatum*). Secondary survey objectives included assessing the chemical's impact on native vegetation and aquatic invertebrates. Representative samples of the target species and native species were brought to the surface for inspection by WDNR personnel, the herbicide applicator and Lake Association Representatives.

Incidental Observations of Invertebrate Life Within and Adjacent to the Chemical Application Zone:

We recorded incidental observations of macroinvertebrate life both in and adjacent to the treatment area following the swimover. This included visual and tactile checking for taxa presence/absence, searching for evidence of mortality, and documenting behavior in observed species.

2,4-D Application:

Immediately following the swimover assessment on September 30, 2007, Dale Dressel of Northern Aquatic Services used a boat mounted broadcast spreader to apply granular 2,4-D at a rate of 155lbs/acre. The reported water temperature at the time of application was 17°C.

RESULTS:

We removed between 25 and 30 cloth bags full of EWM (1 bag = Yellow Dot) at roughly the locations indicated in Figure 2. Densities varied from only a single plant/10m transect to total infestation with all native species excluded. In general, plant density increased from south and east (near dock) to north and west (at the rock wall) where a dense stand covered an area approximately 10m X 10m in 6-14ft of water. Most plants exhibited multiple stems and were close to canopying. With the exception of the dense area near the rock wall, plants were primarily located in a line along the drop off in 8-10ft of water.

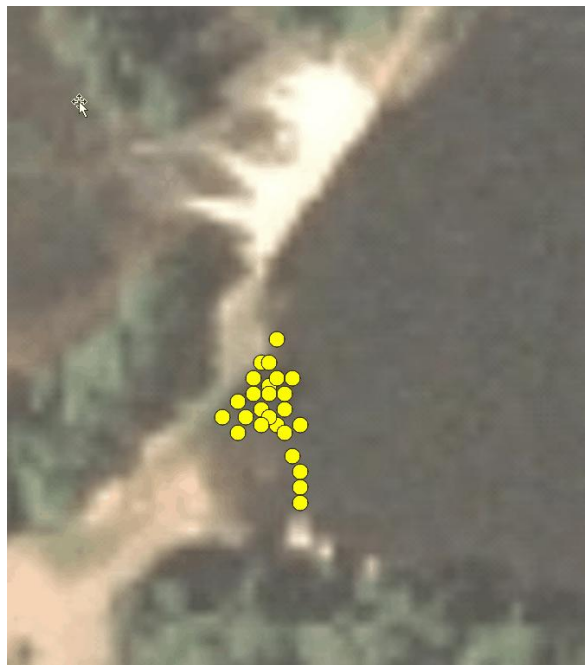


Figure 2: Approximate Location of Initial Hand Removal Effort.

Aquathol Super K Application:

Water clarity was exceptional with visibility approaching 10ft., and this made dive analysis relatively easy. We immediately noticed an area approximately 15m X 15m with almost no vegetation remaining located directly out from the boat landing extending from the shore to the end of the littoral zone. At the edge of this zone of almost complete macrophyte elimination, Robbins' pondweed (*Potamogeton robbinsii*), Coontail (*Ceratophyllum demersum*) and Northern water milfoil (*Myriophyllum sibiricum*) were the first native species to reappear in numbers. With the exception of water milfoils (*Myriophyllum* sp.), the other vegetation was knocked down to the point where it was only inches off the bottom. This made it easy to locate all water milfoil plants in the treatment area and identify them to species. At the northern and eastern edges of the treatment areas, plants such as Wild celery (*Vallisneria americana*), Water marigold (*Bidens beckii*) and Clasping-leaf pondweed (*Potamogeton richardsonii*) reappeared. Noticeably absent inside and outside the treatment zone were Small pondweed (*Potamogeton pusillus*) and most Large-leaf pondweed (*Potamogeton amplifolius*). Both plants were abundant during the hand removal on August 16th, and we are confident their near total absence is due to seasonal senescence rather than the Aquathol treatment.

Manual Removal of Eurasian Water Milfoil Below the Dam:

Canoe surveys from the Gordon Dam to Dry Landing by NPS and WDNR biologists revealed only a few scattered individual plants directly below the dam in 6in deep water on the south shore of the river. On September 6, 2007, WDNR personnel and citizen volunteers located and removed the roots and stems of all known plants in the downstream area. They also visually surveyed the landing above the dam and removed two plants near the rock wall in the treatment zone as well as several floating fragments at the landing itself.

Follow-up Swim Over Assessment of Initial EWM Control Measures:

During our follow-up swim over, we located an additional 11 total plants that were still alive despite both control methods (Figure 3). Of those, six individual plants were directly in front of the dam (blue points) in areas where the herbicide would not have made contact, and poor visibility had prevented us from locating them during the initial dive. Five additional plants were easily located in the prior areas of heaviest infestation (red points). Whether the herbicide knocked all other species down or natural fall senescence was occurring, the EWM was the only plant still standing tall. Although the plants showed evidence of herbicide burn, they had recovered, and some new growth was evident on two of the plants. Roots on these plants were partially white, while roots on the other plants in the treatment zone were mostly black. We also located an additional single plant (yellow point) approximately 40m to the south/southeast along the edge of the littoral zone in an area with native northern water milfoil (*Myriophyllum sibiricum*). This was of concern because it was further away from the landing than any other plant yet located.



Figure 3: Approximate Location of EWM in Follow-Up Assessment.

Incidental Observations of Invertebrate Life Within and Adjacent to the Chemical Application Zone:

Bryozoans, known to be sensitive to poor water quality, were numerous on logs just outside of the chemical application zone. We also witnessed snails actively feeding on dead and dieing plant material both inside and adjacent to the application zone. There was no evidence of mussel mortality, and many individuals were observed actively siphoning inside and outside of the chemical zone. Mussel species observed included Fat Mucket (*Lampsilis siliquoidea*), Three-ridge (*Amblema plicata*), Plain Pocketbook (*Lampsilis cardium*), and Paper Pondshell (*Utterbackia imbecillis*). We also observed freshwater sponges encrusted on native plants such as Large-leaf Pondweed (*Potamogeton amplifolius*) and Fern Pondweed (*Potamogeton robbinsii*) both inside and outside of the application zone.

2,4-D Application:

Due to declining water temperature and the end of the growing season, we did not assess the impact of the 2,4D application. An early spring dive assessment of the area should provide information on whether or not any EWM survived in the chemical treatment area.

DISCUSSION:

Manual Removal of Eurasian Water Milfoil Above and Below the Dam:

Manual removal proved to be relatively easy at the site. Improved water clarity in the spring or fall would have made the job easier, and may have resulted in fewer missed individual EWM plants during the initial dive removal. However, we feel the control method itself was highly successful given the moderate visibility, generally light infestation, and excellent surface support. Having volunteers on-site allowed us to maximize our underwater time as well as free us from excessively worrying about plant fragments. Many eyes below the dam also minimized the chances of overlooking plants.

Aquathol Super K Application:

Koshere (2007) deemed Aquathol Super K application was appropriate at this location for the following reasons: 1) it was late in the growing season and there was likely little impact on the seasonal growth of native plants 2) there is an abundance of native plant propagules either present at or immediately upstream of the site 3) the reduction of plants over the entire area that Aquathol provided made it easy to spot any remaining EWM, either for more hand removal, or for assessment as to how complete the chemical control was.

Follow-up Swim Over Assessment of Initial EWM Control Measures:

We feel the diver hand removal and Aquathol provided acceptable control where visibility was good and the current didn't interfere with contact time. Plants showed evidence of being knocked back and killed throughout the treatment zone with the exception of at the marker buoy near the rock wall (area with the most current/nearest the dam). The single plant found growing outside the treatment zone to the east was a concern. A spring survey and/or treatment should consider following the "milfoil zone" in 8-10 feet of water for some distance up the shoreline to ensure other pioneer plants aren't taking hold.

Incidental Observations of Invertebrate Life Within and Adjacent to the Chemical Application Zone:

The fact that mussels, snails and other sensitive invertebrates seemed unaffected by the Aquathol supports the use of this chemical to control EWM in this pristine habitat area. With the exception of the disappearance of most native plants in the treatment area, we did not notice any difference in animal life or behavior. We failed to notice any visible mortality or animals that looked stressed in anyway. If not for the absence of plants, we would have had no reason to believe a chemical application had occurred.

2,4-D Application:

Koshere (2007) noted that, although this would be considered a late season application for 2,4-D, water clarity was excellent and this provided a significant benefit for diver and/or visual inspection. This factor should be a consideration in the timing of assessments and treatments in future at this or other locations. A negative of late season treatment is the decrease in direct sunlight, but water temps were still in the 15-20°C range and clarity was excellent, both factors that could promote any EWM to actively take up the 2,4-D.

FUTURE MANAGEMENT CONSIDERATIONS:

Discussion between WDNR personnel, site divers and herbicide applicators produced the following considerations for future management at this site and elsewhere.

1. The ecological-trained diver involvement is very helpful, and when possible is strongly encouraged on any new AIS response. In this case, it helped assess and provided information that would be very difficult and time intensive to discover from the surface.
2. We should plan on and encourage additional spring control action. The Lake Association is interested in the follow-through, and they should be involved in the process to increase awareness as well as to assist in the locating of any residual plants in shallow areas; especially below the dam.
3. In spring, a diver should inspect the treatment area to determine the impact of the 2,4-D application in the original known infestation area.
4. Inspection should continue for at least several hundred meters upstream of the area based on the one EWM plant found near the upstream boundary of the original control zone.
5. We will need to weigh and balance the factors of flow, velocity, temperature, and plant growth activity to accomplish another 2,4-D treatment.
6. If we could get a temporary barrier curtain on the site, it would likely improve effectiveness. We should discuss this idea of having a curtain available for its possible statewide use.