

## **Pilot projects to control curly-leaf pondweed or Eurasian watermilfoil on a lake-wide or bay-wide basis for ecological benefits during 2011**

Description of Grants Available from the Minnesota Department of Natural Resources

*This grant is now closed for 2011. Offered November 29, 2010*

***Treatment protocol revised on 5 April 2011***

### **Summary of the Grant Program**

The Minnesota Department of Natural Resources (MnDNR) is offering grants to support pilot projects to control curly-leaf pondweed, Eurasian watermilfoil, or both on a lake-wide or bay-wide (partial lake) basis. The purpose of these projects is to provide ecological benefits as well as relief from the nuisances caused by the plants. Ecological benefits that are hoped to be produced by control of milfoil and curly-leaf include increases in native submersed plants and, in the case of curly-leaf, reductions in levels of phosphorus and algae, which should increase water clarity. These efforts are called pilot projects because it is not known whether the desired ecological benefits can be reliably achieved.

Projects that receive grants are partnerships that usually require a significant investment of local, non-DNR funds to proceed.

It should be noted that the MnDNR expects to continue supporting projects on most of the 26 lakes that received a grant in 2010. Consequently, the MnDNR expects to be able to offer grants to only a few new lakes in 2011.

### **Who may apply for funds for pilot projects?**

Funds for pilot projects are available from the MnDNR to organizations such as lake associations, conservation districts, watershed districts, and municipalities (hereafter called cooperators). To be eligible for this program, a lake must have at least one public water access. Potential cooperators must have a federal tax identification number.

### **Requirements and restrictions on pilot projects**

Grants will not be made for the use of 2,4-D herbicide to control Eurasian watermilfoil.

### **Previously funded projects**

Lake wide or bay-wide projects which proceeded last spring under this grant program will continue, *if they meet the criteria outlined in the “Criteria for evaluating grant applications”*

**\*Previously funded projects must submit an application to receive funds in 2011\***

**New projects:**

- Eurasian watermilfoil, curly-leaf pondweed, or both must occur at a frequency of at least a 25%.
- A survey of submersed aquatic plants in the lake using the point-intercept method should be available. Surveys must have been completed at least as recently as 2008, that is, within the last three years.

**Please see “Criteria for Evaluating Grant Applications” for a complete list of project ranking criteria.**

If you intend to submit an application, please send a short e-mail or leave a message for the Invasive Species Specialist for your region stating your intention to apply. All we need to know is the lake name and the county in which it is found. This will help us to process applications as quickly as possible.

If you would like to discuss the situation on your lake and the grant program please contact the Invasive Species Specialist for your region (Figure 1).

**Invasive Species Specialists by Region**

Northwest (Park Rapids): **Darrin Hoverson**  
218-699-7293, [darrin.hoverson@state.mn.us](mailto:darrin.hoverson@state.mn.us)

West Central (Fergus Falls): **Nathan Olson**  
218-739-7576 ext. 259, [nathan.olson@state.mn.us](mailto:nathan.olson@state.mn.us)

Northeast (Grand Rapids): **Rich Rezanka**  
218-999-7805, [richard.rezanka@state.mn.us](mailto:richard.rezanka@state.mn.us)

Central (Brainerd): **Dan Swanson**  
218-833-8645, [dan.swanson@state.mn.us](mailto:dan.swanson@state.mn.us)

Central and Southeast (St. Paul): **Brittany Hummel**  
651-259-5828, [Brittany.hummel@state.mn.us](mailto:Brittany.hummel@state.mn.us)

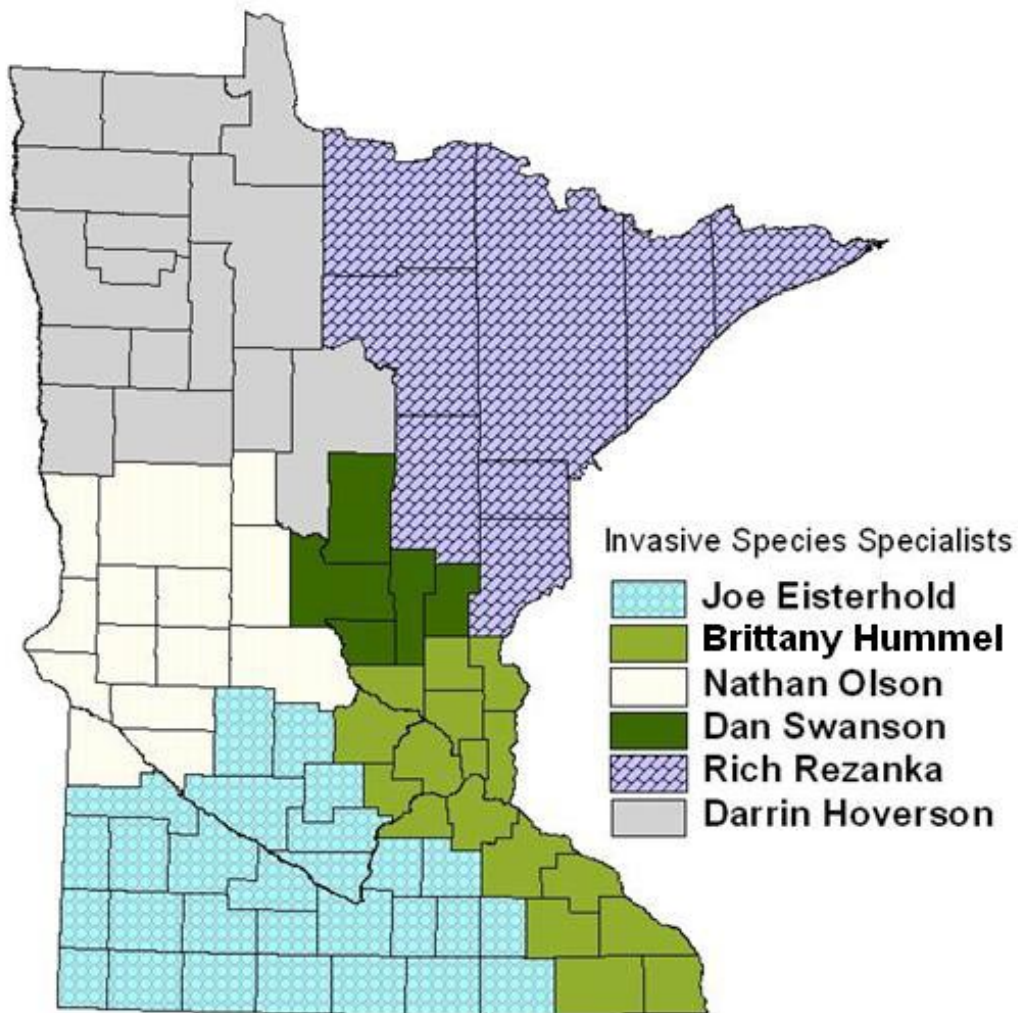
Southern (New Ulm): **Joe Eisterhold**  
507-359-6079 [joe.eisterhold@state.mn.us](mailto:joe.eisterhold@state.mn.us)

**Assistance is also available from:**

Ecological Resources Grants Coordinator (Saint Paul): Wendy Crowell  
651-259-5085 [wendy.crowell@state.mn.us](mailto:wendy.crowell@state.mn.us)

Aquatic Invasive Species Management Coordinator (Saint Paul): Chip Welling  
651-259-5149 [chip.welling@state.mn.us](mailto:chip.welling@state.mn.us)

**Figure 1. Invasive Species Specialists by region**



**Deadline for application: Tuesday, January 18, 2011**

**To learn more about this offer, please read on.**

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## **Problems caused by Eurasian watermilfoil and curly-leaf pondweed**

Eurasian watermilfoil (*Myriophyllum spicatum*) (hereafter called milfoil) and curly-leaf pondweed (*Potamogeton crispus*) are non-native invasive species that cause problems in Minnesota. Both plants can interfere with recreational and other uses of lakes and rivers by producing dense mats at the water's surface. These mats are similar to, but can be more extensive than, those produced by native vegetation. Matted milfoil or curly-leaf can displace native aquatic plants and alter environmental conditions, which in turn may harm fish and wildlife. In addition, curly-leaf is unique because it usually dies back at the end of June or early in July. This may result in rafts of dying plants piling up on shorelines, and often is followed by an increase in phosphorus (Bolduan et al., 1994<sup>1</sup>) and undesirable algal blooms.

## **Description of grants for pilot projects to control curly-leaf pondweed and/or milfoil**

The purpose of offering these grants is to allow a limited number of well-planned lake-wide or bay-wide projects to control curly-leaf pondweed or milfoil or both to go forward in order to learn from them and to potentially achieve some ecological benefits from them. These efforts are called pilot projects because it is not known whether the desired ecological benefits can be reliably achieved. Current results are briefly described below.

Each funded project will be carefully monitored so that we can better predict how and where to use these approaches in the future.

Lake-wide or bay-wide treatments are those that attempt to treat all, or almost all, of the target

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<sup>1</sup> Bolduan, B.R., G.C. Van Eeckhout, H.W. Quade, and J.E. Gannon. 1994. *Potamogeton crispus*: the other invader. *Lake and Reservoir Management*. 10:113-125.

plant in a lake or bay. While we recognize the desire to control curly-leaf pondweed and milfoil to improve lake use, we are focusing the limited funds of this grant program on projects that are designed to provide ecological benefits, as well as providing relief from the nuisance conditions caused by the plants. Ecological benefits include increases in the frequency or abundance of native submersed plants and, in the case of curly-leaf pondweed, may include reductions in levels of phosphorus and algae, which should increase water clarity.

Acceptable proposals must have the following goals:

- A. To reduce curly-leaf pondweed or milfoil or both lake – wide (or bay-wide) in the year of treatment
- B. To provide long –term reduction in curly-leaf pondweed or milfoil or both in the lake
- C. To increase native submersed plants
- D. In the case of curly-leaf pondweed control projects, to reduce levels of phosphorus and algae, and to increase water clarity

### **Results of pilot projects to control curly-leaf pondweed and/or milfoil**

The MnDNR and our cooperators have accumulated a large amount of information on the effects of pilot projects to control curly-leaf pondweed and/or milfoil. Here we provide brief summaries of current results in relation to the goals of these efforts.

#### **Goal A. To reduce curly-leaf pondweed or milfoil or both lake – wide (or bay-wide) in the year of treatment**

Lake-wide treatments with all herbicides used (endothall, triclopyr and fluridone) reduced the frequency, biomass, and surface matting of curly-leaf pondweed and Eurasian watermilfoil during in the year of treatment.

#### **Goal B. To provide long–term reduction in curly-leaf pondweed or milfoil or both in the lake**

In some cases, lake-wide treatments with the herbicides used reduced the amount of area occupied by curly-leaf pondweed or milfoil or both in the year following treatment. The duration or longevity of these reductions is not yet well understood for curly-leaf pondweed. Since lake-wide treatments for four to five years have not eliminated curly-leaf pondweed, continued management would be required on lakes where there is desire to limit the problems caused by the plant. Whole lake Eurasian watermilfoil treatments done with fluridone herbicide appear to significantly reduce the amount of milfoil in a lake for three or four years. Whole-lake treatments with fluridone to control Eurasian watermilfoil have significant potential to do more harm than good, especially in lakes with low water clarity. Consequently, proposed whole-lake treatments with fluridone to control Eurasian watermilfoil are carefully reviewed and often lead to recommendations of alternative approaches.

We hypothesized that a lake must be treated for several years in a row in order to reduce curly-leaf pondweed for the long-term. The basis for this control during consecutive years may deplete the numbers of curly-leaf pondweed propagules, known as turions, in the lake sediment. Lake-wide treatments with herbicides nearly eliminated production of turions by curly-leaf pondweed. Following the first year of lake-wide treatment, the average density of turions in lake sediments appeared to decrease by half. Thereafter, the density of turions in lake sediments remained stable during four to five consecutive years of treatment.

### **Goal C. To increase native submersed plants**

In six of nine lakes treated to control curly-leaf pondweed, abundance, as reflected by biomass, of native plants appeared to increase over time. The principal species that increased included coontail, elodea, and chara. In the other three lakes, biomass of native plants appeared to decrease over time.

In one of four lakes or bays treated to control both Eurasian watermilfoil and curly-leaf pondweed, large decreases in native submersed plants and water clarity were observed following the second year of treatment. In the other three lakes or bays, both decreases in some native submersed plants and increases in others were observed. It has been our observation that in mesotrophic lakes treated with fluridone to control Eurasian watermilfoil, some native submersed plants usually increase after the year of treatment.

### **Goal D. In the case of curly-leaf pondweed control projects, to reduce levels of phosphorus and algae, and to increase water clarity**

Analysis of results from at least eleven lakes treated to control curly-leaf pondweed did not indicate a consistent trend of increasing water clarity. Control of this invasive species does not seem to be an easy or reliable way to improve water quality in lakes.

### **Permits to control aquatic plants and lake vegetation management plans**

Before a pilot project may proceed, the cooperator must obtain a permit to control aquatic plants from the MnDNR Aquatic Plant Management Program for the proposed treatment. The conditions for issuance of the permit will be described in an accompanying lake vegetation management plan (LVMP). The LVMP will be developed by the MnDNR with review by the applicant, and may require the cooperator to provide certain materials to support implementation of the plan. In addition, if the treatment will exceed 15% of the littoral zone of the entire lake, the cooperator must work with the MnDNR to obtain a National Pollution Discharge Elimination System (NPDES) permit from the MN Pollution Control Agency (MnPCA). This is a new requirement that has resulted from a recent court case. The MnPCA is still working out the details of how these permits can be obtained, but it may result in cooperators having to pay an additional permit fee of approximately \$1,300.

### **Eligible pilot projects to control curly-leaf and/or milfoil**

Pilot projects to control curly-leaf and/or milfoil that are eligible to receive a grant from the MnDNR involve treatment with herbicides to control the invasive aquatic plants. The DNR will provide guidance on which herbicides can be used for these projects (see Appendix A). In order to provide long-term reduction of curly-leaf pondweed the treated lake must be treated for several years in a row. This is so that the bank of turions (curly-leaf pondweed propagules in the lake sediment) will be depleted. In the event that the 2011 treatment causes significant negative impacts to the native plant community or water quality or both in the treated lake, the MnDNR will work with the cooperator to develop an alternate treatment plan.

### **Aquatic plant surveys**

To be eligible to receive a grant from the MnDNR for a pilot project in 2011, applicants are required to provide results of pre-treatment surveys of submersed aquatic plants in the lake, or bay, using the point-intercept method, completed at least as recently as 2008. The minimum pre-treatment data required is aquatic plant frequency data for midsummer; two point intercept surveys in the spring and summer are preferred.

Because not all potentially eligible lakes have the required pre-treatment data, the MnDNR may choose to collect pre-treatment aquatic plant survey data on some lakes.

### **Level of funding: for pilot projects to control curly-leaf and/or milfoil**

In 2011 approximately \$450,000 will be available from the MnDNR for these grants. These funds are paid to cooperators as a reimbursement for work that has been completed. This offer of funds is a competitive grant program. There is no guarantee that there will be sufficient funds available from the MnDNR to provide grants to all applicants with reasonable projects. Funds made available through this program must be spent during the calendar year when they are offered and will not be carried over into following years.

Funds from the MnDNR usually do not cover the entire cost of a pilot project. Projects that receive grants are partnerships in the sense that they usually require a significant investment of local, non-DNR funds to proceed. In 2010, funds from the MnDNR covered a range of 34% to 100% of the costs of treatments made as part of pilot projects. In the past the MnDNR expected that recipients of grants would commit to providing local matching funds necessary to conduct lake-wide treatments for at least three and usually five consecutive years. This approach is under review considering the results described above. It should be noted that only two of the 26 lakes that received a grant from the DNR in 2010 completed their fifth year of treatment in 2010. For this reason, we expect to offer grants to only a few new lakes in 2011.

The MnDNR will arrange for **and fund** the required aquatic plant monitoring for lakes offered funding for control work in 2011. The actual amount granted each approved project will depend on the number of approved projects and the size of the littoral zones of the lakes approved for grants. For projects that were funded under this grant program in previous years, the amount of the grant will also be based in part on the cost of the previous year's treatment. The following table provides an estimate of the amount that will be granted to each project, based on the size

of the lake's littoral zone. If several bays are proposed for treatment on one lake, the littoral acres of the bays will be combined to determine the amount of funding available. You can find the size of the littoral zone of a lake by going to the **DNR Lake Finder**.

<http://www.dnr.state.mn.us/lakefind/index.html>. Once you find a lake in Lake Finder, you can look under **Lake Information** for the size of the lake and the size of its littoral zone.

Lake or bay Littoral Acres	Estimated Grant Amount for control projects
0-150	\$10,000
151-300	\$15,000
301-450	\$20,000
451-600	\$25,000
Greater than 600	\$30,000

### **Eligible expenses for pilot projects eligible for reimbursement by the MnDNR**

The following expenses incurred by a cooperator will be eligible for reimbursement by the MnDNR under this program: cost for application of herbicide, cost of herbicide, the cost of required permits, and the cost of analyses to determine concentrations of herbicide in treated lakes if needed.

If you plan to apply for funding, please follow the instructions in this announcement carefully. If you have any questions, please contact your **Invasive Species Specialists** (see the list and map on pages 2- 3).

### **Responsibilities of cooperators who receive grants from the MnDNR for pilot projects**

- ✚ Select an applicator and arrange for treatment. We strongly recommend that you obtain two bids for the project. Attached is a list of licensed commercial applicators of aquatic herbicides.

- ✚ Monitor water clarity bi-weekly from May through September for using a Secchi disk. The Minnesota Pollution Control Agency (MnPCA) Citizen Lake Monitoring Program (CLMP) has instructions on how to collect Secchi depth data. Secchi disk data must be provided to the **MnDNR Invasive Species Specialist in your region (see pages 2 and 3) by November 15, 2011**. You can sign up as a lake volunteer to collect Secchi depths and purchase a Secchi disk from the MnPCA for approximately ten dollars. For Information about the program please contact: Johanna Schussler or Miranda Nichols at 800-657-3864 (Greater MN), 651-296-6300 (Twin Cities Metro Area), or visit the CLMP website: <http://www.pca.state.mn.us/water/clmp.html>
- ✚ Monitor spring lake water temperatures in order to determine the correct timing for treatment.
- ✚ Obtain a commitment from lakeshore owners to do minimal other treatment of native aquatic vegetation for nuisance control, so that the effects of the lake-wide treatment can be determined.

## **Resources to help you complete your application:**

The MnDNR website [www.dnr.state.mn.us](http://www.dnr.state.mn.us). In particular the MnDNR Lake Finder <http://www.dnr.state.mn.us/lakefind/index.html>. Once you find the lake in Lake Finder you can look under Lake Information for the size of the lake and the size of its littoral zone. You can look under Lake Maps to view and download a depth map of the lake.

MnDNR **Invasive Species Specialists and other staff** are available to answer any questions you may have about this grant program (see pages 2 - 3).

## **Application Procedure and Timeline to obtain funds for Lake-wide or bay-wide control of milfoil, curly-leaf pondweed, or both.**

### **Submittal of an application for a grant**

To help us process applications as quickly as possible, if you intend to submit an application please send a short e-mail, or leave a message for the Invasive Species Specialist in your region (see pages 2 – 3) stating your intention to apply. All we need to know is the lake name and the county in which it is found. This is not required, but would be appreciated.

**Step 1. Applicants:** Return a completed Grant Application Form with the required materials by **Tuesday January 18, 2011** to:

#### **Wendy Crowell**

Ecological Resources Grants Coordinator  
Minnesota Department of Natural Resources  
Ecological Resources, Box 25  
500 Lafayette Rd  
St. Paul, MN 55155  
[wendy.crowell@state.mn.us](mailto:wendy.crowell@state.mn.us)

## **If you do not receive an acknowledgement of your application, please contact Wendy Crowell immediately.**

**Step 2.** The Ecological Resources Grants Coordinator, Wendy Crowell, will record the date the grant application came in and send a note back telling the applicant it was received. The grant proposal will then be forwarded to an Invasive Species Specialist for review.

**Step 3. Applicants: Submit an application for a permit to control aquatic plants, and if needed, an NPDES permit application. Aquatic Plant Management permit** applications should be sent to the MnDNR Aquatic Plant Management Program. Information about the program can be found on the MnDNR website: <http://www.dnr.state.mn.us/eco/apm/index.html>. You must obtain a permit before any work can proceed. The DNR will work with you to make sure the NPDES permit process is completely correctly.

**Step 4. MnDNR grant review committee:** Review applications for grants and permits and

determine which projects will receive a permit to make the proposed treatment and funding, as well as the specific amount of funding available for each project. We will review applications as soon as we receive them, and contact both **recipients of grants** and applicants who will not receive a grant. This will be done in late February. The review committee will include Invasive Species Specialists, DNR Fisheries staff, and other staff from the Division of Ecological Resources.

**Step 5.** Non-governmental organizations that are offered a grant for more than \$25,000 must submit a copy of their most recent financial statement for review, such as an IRS Form 990.

**Step 6.** The grant review committee will forward its' recommendations to the Ecological Resources Grants Coordinator, Wendy Crowell, who will write grant agreements and send them to recipients of grants. At this point all grant application materials that have been submitted in response to this grant offer will become public data.

**Step 7. Recipients of grants:** Review the grant agreement and return a signed copy to the Ecological Resources Grants Coordinator, Wendy Crowell. **You must return a signed Grant Agreement to the MnDNR before proceeding with your project.** Work done without a signed grant agreement will not be eligible for reimbursement by the MnDNR.

**Step 8. Recipients of grants:** Select a contractor to do the work **before** proceeding with the proposed control project. Attached is a list of licensed commercial applicators of aquatic herbicides. **We strongly suggest you solicit at least two competitive bids for the proposed work.** Omission of a firm or company from the attached lists is not meant to exclude any legitimate firm or company from consideration, nor is inclusion in the attached list intended as an endorsement by the MnDNR.

**Step 9. MnDNR:** Contact the successful applicant to finalize the details of the proposed treatment. Depending on the treatment method, the target plant, and the weather, treatments should proceed between **mid-April and mid-May**.

**Step 10. Recipients of grants and MnDNR: Monitoring:** Recipients of grants will arrange for secchi depths and spring water temperatures to be collected. MnDNR will arrange for aquatic plant monitoring.

**Step 11. Recipients of grants:** Pay the contractor for the work undertaken and request reimbursement from the MnDNR. After a grant agreement between the organization and the MnDNR has been fully executed and the proposed work has been completed, the cooperators may bill the MnDNR for any amount up to the maximum specified in the grant agreement, and be reimbursed. Requests for reimbursement should be sent to the Ecological Resources Grants Coordinator, Wendy Crowell and must include all required information listed below.

**The request for reimbursement should be sent as soon as possible after the treatment has been done.**

### **Required Information, to be included with your request for reimbursement.**

- ✚ A request made in writing for reimbursement, preferably on stationary of the cooperator's organization, and signed by the cooperator for reimbursement by the MnDNR.
- ✚ Copies of any bids received.
- ✚ A copy of the applicators treatment report, which should include a description of methods used for control of milfoil or curly-leaf pondweed, the name of herbicide and rate of application, date(s) when work was done, and maps of area(s) showing areas actually treated, if they were different from area(s) originally proposed for treatment.
- ✚ Copy of invoice from the contractor, with proof of payment.
- ✚ If you would like reimbursement for permit fee(s) please include a copy of permit for the work, and proof of fee paid for the permit.
- ✚ Copies of all data, such as Secchi depth and water temperatures, collected by the cooperator.

**Step 12. MnDNR:** Reimburse the cooperator for eligible costs associated with the treatment or pre-treatment monitoring.

## **Appendix A. Protocols for lake-wide or bay-wide treatment to control invasive submersed plants**

Past lake-wide projects have used the following treatment methods: early-season treatment of curly-leaf pondweed with endothall, early-season treatment with fluridone, early season treatment of curly-leaf and milfoil with endothall and an auxin-mimic herbicide, and treatment of milfoil with auxin-mimics. The auxin – mimics that have been used in the past are 2,4, D and triclopyr herbicides. These are treatment methods that have shown promise based on research done in controlled environments.

Legislation passed in 2009 prohibits the MnDNR from providing grants for treatment with herbicides that are likely endocrine disruptors. Because of this requirement we are not able to offer grants for the use of 2,4-D herbicide.

MnDNR staff will work with grant recipients and their contracted herbicide applicator to assure the treatments are done with an acceptable herbicide, at the proper time, and with the proper rate of herbicide. Actual areas that will be treated should be based on pretreatment plant surveys conducted in April 2011.

Development of protocols for lake-wide treatments is based on the scientific literature and experiences in Minnesota and elsewhere. The effects of treatments of submersed plants with herbicides depend on the concentrations of herbicide produced over time. These effects include efficacy of control of the target plant and possible unintended damage to non-target plants, and additional possible side effects, e.g., decrease in water clarity due to reduction in submersed aquatic plants.

On the label for any given herbicide, maximum rates of application in amount of herbicide per unit area or unit volume are specified. These rates are based upon the nominal concentration of herbicide in the unit volume of water to be treated.

For example, according to the specimen label for Renovate® 3, application of 5.4 gallons of this product to an area of an acre and six feet deep will produce a concentration of 1 ppm triclopyr acid in water. This concentration may be called the target or nominal concentration.

The effect of such a treatment on Eurasian watermilfoil may be estimated based on the duration of exposure to the herbicide. Ideally, one has access to documentation of concentration – exposure time (CET) relationships produced by experiments done under controlled conditions in a growth chamber (Netherland and Getsinger 1992). In a lake, the concentrations of herbicide will decrease over time due to factors such as dissipation and degradation of the herbicide (Table 1).

Table 1. Concentrations of triclopyr herbicide in lakes following application with a target concentration of 1 mg ae per liter (Poovey et al. 2004).

Hours after treatment	triclopyr in mg ae per liter
1	1.6
4	0.9
8	0.3
24	0.04
48	0.03
72	0.02

The actual exposures produced by applications of herbicide to lakes may vary in relation to a number of factors. For example, applications made on a windy day to a deep site located on the lake-ward edge of a stand of Eurasian watermilfoil and adjacent to deeper areas farther off-shore might result in very short durations of exposure of plants to herbicide. The results might be little or no control of the target plant. On the other hand, applications made to a shallow site located in an enclosed bay where there is little if any flow of water through the area and no currents created by wind, very long durations of exposure of plants to herbicide may be produced. These exposures may result in reductions in the target plant and also non-target plants.

Consequently, it may be difficult to choose a target concentration or a range of concentrations to

be included as a condition in an APM permit (MR 6280.2050, Subp. 6, B). Selective control of invasive aquatic plants such as Eurasian watermilfoil is an evolving science and treatment protocols are likely to be revised as new information becomes available.

Below are the types of treatments that have been approved under this program in the past.

#### **Lake-wide or bay-wide treatment with endothall to control curly-leaf pondweed**

These treatments treat almost all of the curly-leaf in the lake or bay. Treatment of areas more than one acre in size are done at a low rate, 0.75 ppm to 1.0 ppm with 1.5 ppm used for areas less than one acre in size. The treatments are done when water temperatures are between 50 and 60 F, and are increasing.

#### **Lake-wide or bay-wide treatment with a combination of endothall and an auxin-mimic herbicide to control Eurasian watermilfoil**

These treatments treat almost all of the Eurasian watermilfoil in the lake. Treatments are done at a low rate, with the combination of endothall (1.0 ppm) and triclopyr (0.25 ppm - 1.0 ppm). The treatments are done when water temperatures are between 50 and 60 F, and are increasing.

#### **Lake-wide or bay-wide treatment with an auxin-mimic herbicide to control Eurasian watermilfoil**

These treatments are planned to control almost all of the Eurasian watermilfoil in the lake or bay. Treatments may be done at a range of rates as specified on the label for the herbicides. Approaches planned for 2011 include application of triclopyr at a range of rates and various times of the year. These range from application of triclopyr to produce a target concentration of  $\leq 0.5$  ppm at a time during spring when water temperatures are between 50 and 60 F in an enclosed bay to a later treatment intended to produce target concentrations from 1 to 2 ppm in open bays.

#### **Whole Lake treatment with fluridone herbicide**

## **General Protocols for whole lake treatments with fluridone**

For deep lakes that typically stratify, measurements of temperatures over a complete depth profile are taken regularly prior to the expected date of treatment in order to determine if the lake has stratified, and the depth of the epilimnion. Fluridone herbicide will only mix into the epilimnion, so it is extremely important to know the depth of the epilimnion at the time of treatment in order to determine the amount of fluridone to apply. The amount of fluridone to be applied to the lake is determined by using the volume of the epilimnion.

Samples of water for analysis of concentrations of fluridone are taken from at least four locations in the lake at 1 day, 3 days, 7 days, 14 days, and 21 days after treatment, and then again at 1 day, 3 days, 7 days, 14 days, 30 days, and 60 days following the second or “bump” treatment. Samples of water for analysis of concentrations of fluridone can be taken by lake residents, or any responsible party, and sent to SePro Corp for analysis. For information about the analyses, directions for collection of samples, and “Chain of Custody” forms, please go to: <http://www.sepro.com/default.php?page=labservices>. Results of FastTest<sup>®</sup> immunoassays should be provided to the MnDNR as soon as they are available so that we can help determine the timing and rate of application for the second treatment.

## **Specific Protocols for treatments of milfoil with fluridone**

Prior to planning treatment of a lake with fluridone to control milfoil, an assay of the susceptibility of the milfoil in the lake proposed for treatment should be done. SePro Corp can provide PlanTest<sup>®</sup>, which can do this assay. In general, for milfoil treatments, fluridone should be applied at a low rate (4.0 - 4.5 ppb), with a “bump” treatment at 25 - 30 days to bring the concentration back up to 4.0 ppb. The initial treatment should occur in the spring (mid-May). If curly-leaf pondweed is also present and causes a significant nuisance, treatment should be done earlier (mid to late April) to control that species as well as milfoil.

## **Specific Protocols for treatments of curly-leaf pondweed with fluridone**

In general, curly-leaf treatments should be done at a lower rate (4.0 ppb), with a similar bump treatment after 25 - 30 days, and the initial treatment should be done as soon as possible after ice out.

## Literature cited

- Netherland, M.D., and K.D. Getsinger. 1992. Efficacy of triclopyr on Eurasian watermilfoil: concentration and exposure time effects. *Journal of Aquatic Plant Management* 30: 1-5.
- Poovey, A.G., K.D. Getsinger, J.G. Skogerboe, T.J. Koschnick, J.D. Madsen, and R.M. Stewart. 2004. Small-plot, low-dose treatments of triclopyr for selective control of Eurasian watermilfoil. *Lake and Reservoir Management* 20(4): 322-332.