ORIGINAL

STORAENSO

February 1, 2006

Office of the Secretary,
Federal Energy Regulatory Commission
888 1st Street, N.E.
Washington, D.C. 20426

Little Quinnesec Falls Hydroelectric Project, FERC No. 2536 – Article 409, Exotic Species – Approval Request for Eurasian Milfoil Control Plan

In accordance with the Commission order approving the monitoring plan for Purple Loosestrife and Eurasian Milfoil within the Project boundary, Stora Enso submitted the monitoring report for 2005. On November 10, 2005 Stora Enso was contacted by the Michigan Department of Natural Resources (MDNR) requesting a Eurasian Milfoil control plan for resource agency review. As per the FERC Order Modifying and Approving Purple Loosestrife and Eurasian Milfoil Monitoring Plan, issued March 13, 1998, we consulted with the appropriate resource agencies of MDNR, Wisconsin Department of Natural Resources (WDNR) and the U.S. Fish and Wildlife Service. Consultation took place via email distribution of a draft Eurasian Milfoil Control Plan on December 14, 2005. Comments were received from MDNR (attached). No other comments were directed to us, however our scientific consultant did interview representatives from WDNR and their comments are included in the consultant's response. Stora Enso is hereby filing an original and eight copies of the Eurasian Milfoil Control Plan to the Commission for approval.

Discussion

Stora Enso conferred with the scientific consultant performing the annual exotic species monitoring at the Little Quinnesec Falls (Little Q) Hydroelectric Project, White Water Associates, Inc. in the preparation of our plan.

Invasive species in a waterway can have dramatic effects on an ecosystem. They are readily spread between lakes and rivers by boaters carrying plant fragments on their boats and trailers. The Eurasian Milfoil plants easily break into small pieces and are swept downstream in a river system establishing colonies where they can root.

Eurasian Milfoil has long been known to exist in the Menominee River watershed, so finding it in Little Q is not surprising. The following table illustrates the annual Eurasian Milfoil findings in Little Q.

Year	Sites
2002	2
2003	1
2004	7
2005	3

Eurasian Milfoil was first documented to be present in Little Q in 2002. However, at the time it was suspected that it had been there awhile given prior borderline leaves. Only one site in Little Q has appeared from year-to-year and this is a very small site, consisting of only a few plants. One of the current documented sites is not part of the natural river system; it is located in a man-made canal for a residential development and is outside of the FERC project boundary. All Eurasian Milfoil sites found in Little Q as part of the annual monitoring plan have been and continue to be very small in size.

Eurasian Milfoil is the biggest problem in species poor, nutrient rich lakes. The Little Q flowage has a very strong and varied aquatic plant community that we believe is helping to keep Eurasian Milfoil in check. Currently, it shows no signs of spreading; in fact it has disappeared at some of the sites. We are concerned that using herbicides may actually open up areas for Eurasian Milfoil to colonize.

Eurasian Milfoil Control Plan

We propose to continue with the current annual monitoring program. In the event that Eurasian Milfoil colony trending increases over a three year period, we will consult with the appropriate resource agencies to determine an appropriate control treatment plan and file the plan with the Commission for approval.

Conclusion

Eurasian Milfoil is not taking over the Little Q flowage. It is known to exist in areas upstream and downstream of Little Q. If an aggressive Eurasian Milfoil control program is implemented, it needs to be a coordinated effort in the entire Menominee River Watershed and neighboring lakes, not just in a few select areas. Otherwise, it will reappear in the selected treatment areas.

Stora Enso believes that the annual exotic species monitoring studies were conducted based on sound scientific methodology by our scientific consultant. The results of the annual monitoring for Eurasian Milfoil do not show an upward trend and do not support implementing a control program. Our scientific consultant, White Water Associates, Inc. was provided with the MDNR comments. Their response is also attached.

Sincerely,

STORA ENSO NORTH AMERICAN OPERATIONS

Mike Schreier
Resources Manager

Enclosures

CC: File (Little Quinnesec Falls, LG-90-30 – Article 409)
White Water Associates, Inc.
Tom Witt – N
Ms. Peggy A. Harding, Regional Director – FERC, Chicago, IL
Wisconsin Department of Natural Resources, 101 North Ogden, Peshtigo, WI 54157
Mr. John Suppnick, Michigan Department of Environmental Quality, 300 S. Washington, 2nd Floor, Knapp Center, Lansing, MI 48933
Mr. Larry Thompson, U.S. Fish & Wildlife Service, New Franken, WI 54311-8331
Mr. Don Novak, Administrator, City of Niagara, 1029 Roosevelt Road, Niagara, WI 54151
Ms. Angie Tornes – National Park Service, Milwaukee, WI
Ms. Jessica Mistak – Michigan Department of Natural Resources, 484 Cherry Creek Road, Marquette, MI 49855

Schreier, Mike

From: Schreier, Mike
Sent: Wednesday, December 14, 2005 10:46 AM
To: Jessica Mistak; Robert Martini (martire@dnr.state.wi.us); Tom Meronek (meront@dnr.state.wi.us); Janet Smith (janet_smith@fws.gov); Larry Thompson (Larry_Thompson@fws.gov)
Cc: Scharff, Thomas; 'Witt, Tom'; 'David Tiller'
Subject: *Little Quinnesec Falls, FERC No. 2536, Draft Eurasian Milfoild Control Plan*

Attachments: 2005 E Milfoil control plan - Draft.pdf

Attached is a draft copy of a Eurasian Milfoil Control Plan for the Little Quinnesec Falls Hydroelectric Project, FERC No. 2536. After filing the annual exotic species monitoring report with FERC, Stora Enso was contacted by the Michigan Department of Natural Resources requesting a Eurasian Milfoil control plan. As per the FERC order approving the monitoring plan for Purple Loosestrife and Eurasian Milfoil, we are providing the resource agencies the draft control plan for your review and comment, before filing it with FERC.

Please provide your emailed comments to us by January 23, 2006. Any comments you provide will be filed to FERC in conjunction with our final filing.

2005 E Milfoil control plan - ...

Mike Schreier
Consolidated Water Power Company
A subsidiary of Stora Enso North America
Phone: (715) 422-3927
FAX: (715) 422-4112

DRAFT

Little Quinnesec Falls Hydroelectric Project, FERC No. 2536 – Article 409, Exotic Species –Eurasian Milfoil Control Plan

Discussion

Stora Enso conferred with the scientific consultant performing the annual exotic species monitoring at the Little Quinnesec Falls (Little Q) Hydroelectric Project, White Water Associates, Inc. in the preparation of our plan.

Invasive species in a waterway can have dramatic effects on an ecosystem. They are readily spread between lakes and rivers by boaters carrying plant fragments on their boats and trailers. The Eurasian Milfoil plants easily break into small pieces and are swept downstream in a river system establishing colonies where they can root.

Eurasian Milfoil has long been known to exist in the Menominee River watershed, so finding it in Little Q is not surprising. The following table illustrates the annual Eurasian Milfoil findings in Little Q.

Year	Colonies
2002	2
2003	1
2004	7
2005	3

Eurasian Milfoil was first documented to be present in Little Q in 2002. However, at the time it was suspected that it had been there awhile given prior borderline leaves. Only one colony site in Little Q has appeared from year-to-year and this is a very small site, consisting of only a few plants. One of the current documented sites is not part of the natural river system; it is located in a man-made canal for a residential development and is outside of the FERC project boundary. All Eurasian Milfoil sites found in Little Q as part of the annual monitoring plan have been and continue to be very small in size.

Eurasian Milfoil is the biggest problem in species poor, nutrient rich lakes. The Little Q flowage has a very strong and varied aquatic plant community that we believe is helping to keep Eurasian Milfoil in check. Currently, it shows no signs of spreading; in fact it has disappeared at some of the sites. We are concerned that using herbicides may actually open up areas for Eurasian Milfoil to colonize.

Eurasian Milfoil Control Plan

We propose to continue with the current annual monitoring program. In the event that Eurasian Milfoil colony trending increases over a three year period, we will consult with the appropriate resource agencies to determine an appropriate control treatment plan and file the plan with the Commission for approval.

Conclusion

Eurasian Milfoil is not taking over the Little Q flowage. It is known to exist in areas upstream and downstream of Little Q. If an aggressive Eurasian Milfoil control program is implemented, it needs to be a coordinated effort in the entire Menominee River Watershed and neighboring lakes, not just in a few select areas. Otherwise, it will re-colonize in the selected treatment areas.

STATE OF MICHIGAN
JENNIFER M. GRANHOLM
GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LANSING

REBECCA A. HUMPHRIES
DIRECTOR

Refer to: 4202.2.32

January 3, 2006

Mr. Mike Schreier
Stora Enso
P.O. Box 8050
Wisconsin Rapids, WI 54495-8050

Dear Mr. Schreier:

Subject: Little Quinnesec Falls (FERC # 2536) Eurasian Watermilfoil Control Plan

After reviewing Stora Enso's October 2005 Annual Report on Purple Loosestrife and Eurasian Watermilfoil Monitoring, the Michigan Department of Natural Resources (DNR) asked for additional information to satisfy the FERC Order Modifying and Approving Purple Loosestrife and Eurasian Watermilfoil Monitoring Plan dated March 13, 1998. Specifically, we asked for information on the relative size of the colony, percentage of surface water covered, and comparison of Eurasian watermilfoil infestation. After subsequent communication with Stora Enso, we were provided with limited information from their consultant who said that "surface coverage is probably less than 1 acre" (see attached email correspondence dated 11/3/20005 and 11/7/2005).

Based on our concerns regarding the spread of Eursasian watermilfoil, on November 10, 2005, the DNR provided a written request to Stora Enso asking them to provide a plan for Eurasian watermilfoil control at the Little Quinnesec Falls hydroelectric project (see attached email dated 11/10/2005). In response, a draft plan was provided to DNR on December 14, 2005.

The DNR comments on the Little Quinnesec Draft Eurasian Milfoil Control Plan are as follows:

In the December 14, 2005 draft plan, Stora Enso proposes no control of Eurasian watermilfoil. Instead, Stora Enso proposes to continue current annual monitoring for three additional years to determine if the colonies increase. If the colonies increase, Stora Enso will then work with the resource agencies to determine an appropriate control plan. The DNR is opposed to this plan. We are especially concerned about the likely spread of Eurasian watermilfoil not only at the Little Quinnesec Fall project, but also in other bodies of water, that could occur during the next three years. Additionally, given the lack of information collected by Stora Enso to date, we have reservations regarding the ability to accurately quantify an increase in Eurasian watermilfoil at the project. Furthermore, it is our understanding that the March 13, 1998 FERC Order clearly stated "In the event that the resource agencies determine Eurasian watermilfoil needs to be controlled, the licensee must consult with the appropriate resource agencies to develop a plan to control or remove Eurasian watermilfoil and file the plan with the Commission for approval". Although the DNR followed this FERC order in asking Stora Enso to prepare a plan to control or remove Eurasian watermilfoil, the recent plan submitted by Stora Enso makes no attempt to fulfill this request.

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To support their claim that control of Eurasian watermilfoil is unnecessary, Stora Enso expressed concerns that the application of herbicide (one method that may be used in control) may open up additional areas for Eurasian watermilfoil to colonize. We believe this claim to be unjustified. After reviewing several scientific articles and speaking to experts on nuisance aquatic plant control, the DNR has found no evidence that control of Eurasian watermilfoil will encourage additional Eurasian watermilfoil growth.

Stora Enso also suggested that control of Eurasian watermilfoil at the Little Quinnesec project would be futile unless it is done in conjunction with a coordinated effort to control Eurasian watermilfoil in the Menominee River. This concern has been met as the DNR is currently working with We Energies to control Eurasian watermilfoil at Twin Falls Flowage (FERC # 11831), the only other hydroelectric project on the Menominee River where this nuisance plant has been identified.

The DNR has recently taken a more proactive stance towards controlling nuisance species at hydroelectric projects. We are concerned about the well-documented potential damage to aquatic communities and recreational use caused by Eurasian watermilfoil (http://www.dnr.wi.gov/invasives/fact/milfoil.htm) and we believe that early control of this invasive species is vital. It is also clearly documented that early control is one of the best measures of protection against invasive species such as Eurasian watermilfoil. We understand that, by controlling now when the plants are limited to a few areas, we decrease the likelihood that the invasive species will spread and allow the licensee to provide control measures at a reduced cost. Although the lack of information provided by Stora Enso does not allow us to ascertain whether or not there is less Eurasian watermilfoil in Little Quinnesec compared to past years, we believe this is irrelevant. The DNR believes control of Eurasian watermilfoil at this early juncture is both important and necessary to protect the environmental and recreational values associated with Little Quinnesec Falls and surrounding waters.

If you have any questions about this matter, please contact me at 906-249-1611 ext 308 or mistakjl@michigan.gov. If you wish to contact me in writing, my address is:
Marquette Fisheries Station
Michigan Department of Natural Resources
484 Cherry Creek Rd
Marquette, MI 49855

Sincerely,

Jessica Mistak

Jessica Mistak, Senior Fisheries Biologist

cc: Mark Holey, FWS
Bob Martini, WDNR
Mike Herman, DNR
Chris Freiburger, DNR

From: Jessica Mistak [mailto:mistakjl@michigan.gov]
Sent: Thursday, November 03, 2005 1:04 PM
To: Schreier, Mike
Cc: Bob Martini; Janet Smith
Subject: Little Quinnesec Exotic Species Report

Mike,
I reviewed the October 7, 2005 Exotic Species Report for Little Quinnesec and noticed that the report failed to include the relative size of Eurasian watermilfoil colonies as well as the percentage of surface water they covered. Please provide this information, as well as a comparison to past years, so that we may use it in our evaluation of whether or not control is necessary.
Thanks,
Jessica

Jessica Mistak, Senior Fisheries Biologist
MDNR Marquette Fisheries Station
484 Cherry Creek Rd
Marquette, MI 49855
906-249-1611 ext. 308
FAX 906-249-3190

>>> "Schreier, Mike" <Mike.Schreier@storaenso.com> 11/03/2005 4:59 PM >>>

David,Would you be able to provide the data that Jessica Mistak of the Michigan DNR is requesting below? Thank you.
Mike Schreier
Consolidated Water Power Company
A subsidiary of Stora Enso North America
Phone: (715) 422-3927
FAX: (715) 422-4112

From: David Tiller <david.tiller@white-water-associates.com>
To: <mistakjl@michigan.gov>
Date: 11/07/2005 11:23:32 AM
Subject: Eurasian Water milfoil

Jessica,
This is in reference to your inquiry to Stora Enso and the Menominee River. Most of this impoundment is moving water and (so far) E. milfoil has not established itself in the larger system though bits of floating leaves are occasionally seen. Some backwaters do have the plant but even there it does not seem to be "taking over". Surface coverage is probably less than 1 acre. However, some of these backwaters are extensive, shallow, and mucky and nearly physically impossible to get everywhere. We had some show up in a particular backwater several years ago and expected rapid growth. I could not find it there this year. I have no explanation as to why this is. I have wondered

(and hoped) that like killer bees, contact with and the introduction of less virulent genetic varieties would modify E. milfoil's bad behavior.
Dave Tiller

From: Jessica Mistak
To: Schreier, Mike
Date: 11/10/2005 8:11:09 AM
Subject: RE: Little Quinnesec Exotic Species Report

Mike,
According to Dave Tiller of White Water Associates, surface coverage of Eurasian watermilfoil at Little Quinnesec is probably less than 1 acre, although there were some backwater areas that could not be evaluated do to their shallow, mucky nature. Dave believes that, at this point, Eurasian watermilfoil does not appear to be "taking over" the plant community. As you are probably aware, Eurasian watermilfoil is invasive and very aggressive in nature, often out-competing native plants. This results in a decline of native plants along with species richness.

Michigan DNR has recently taken a more pro-active stance on control of invasive aquatic plant species, especially near hydroelectric projects. As a result, we would like to work with you to control Eurasian watermilfoil at the Little Quinnesec project. The FERC Order Modifying and Approving Purple Loosestrife and Eurasian Milfoil Monitoring Plan dated March 13, 1998 states "In the event that the resource agencies determine Eurasian milfoil needs to be controlled, the licensee must consult with the appropriate resource agencies to develop a plan to control or remove Eurasian milfoil and file the plan with the Commission for approval." Given the small area where Eurasian watermilfoil was identified, we believe it is an opportune time to employ control efforts at the Little Quinnesec project. By controlling now, when the plants are limited to a few areas, you decrease the likelihood that the invasive species will spread and provide control measures at a reduced cost.

As a start, Michigan DNR recommends the following control measures:
- For stands 10,000 square feet to 5 acres, we recommend selective (systemic) chemicals and introduction of native milfoil weevils.
- If chemical treatment is necessary, we recommend 2,4-D application in early spring (one week after ice out until littoral zone reaches 60°F). After the water reaches 60°F, native plants begin growing and could be damaged. Treatment with 2,4-D is recommended again in the fall after the native plants have died back. The chemical should be sprayed 15 to 20 feet around the bed to help kill off runners and smaller plants not visible from the boat.
- Since chemicals are 80-85% effective, chemical treatment should be followed by spring and fall treatment over the same beds.
- Weevils will suppress Eurasian watermilfoil, not eliminate it. Therefore, control by weevils is most useful for long-term control in lower priority sites and over large areas where other management actions are less effective. High priority areas where effective and rapid control is needed (e.g., boat channels, beaches, docks) should be managed with other approaches.
- The licensee should determine if the native milfoil weevil, Euhrychiopsis lecontei, is present in the impoundment. This can be done by following procedures outlined in the following University of Minnesota link http://www.fw.umn.edu/research/milfoil/milfoilbc/Doyouhaveweevils.html. Additionally, if the weevil is found, measures should be taken to encourage overwinter survival (this may include reduced drawdown and increased leaf litter along shoreline).

-We recommend that the weevil are stocked at a density of 10 per m2 or 100,000 per ha, which is less than the 25m-2 recommended[1], but should be sufficient to allow population viability.

Please provide a plan for resource agency review within 30 days. We look forward to working with you on this.
Jessica

[1] Newman, R.M., Ragsdale, D.W., and Biesboer, D.D. 1999. Factors influcencing the control of Eurasian watermilfoil with native or naturalized insects. Fourth Status Report for 1999-2001 to the Minnesota Department of Natural Resources, Ecological Services, St. Paul, MN.

CC: Freiburger, Chris; Goodreau, Ken; Herman, Michael; Martini, Bob; Smith, Janet; Tiller, David; Witt, Tom

ECOLOGICAL CONSULTING AND
ENVIRONMENTAL LABORATORY SERVICES

WHITE WATER ASSOCIATES, INC.

January 30, 2006

Stora Enso
Attention: Mike Schreier
P.O. Box 8050
Wisconsin Rapids, Wisconsin 54495

Subject: Review of Status of Eurasian Water Milfoil in Little Quinnesec Falls Project (FERC #2536) with Special Reference to Population Control.

Dear Mr. Schreier:

You have requested that we review the status of Eurasian water milfoil (*Myriophyllum spicatum* L.) in the Little Quinnesec Falls Project (FERC #2536) with special attention paid to population control of this non-native species. As part of this review we directly address comments made by the MDNR in a January 3, 2006 letter to Stora Enso regarding the Little Quinnesec Falls Eurasian Water Milfoil Control Plan.

We have organized this review in five sections. The "Background" describes our background and long history with the Little Quinnesec Falls (Little Q) Project. The section entitled, "Little Q Status" summarizes what we know about the Eurasian water milfoil population in Little Quinnesec Falls Impoundment. The next section, "Menominee Watershed Status," briefly summarizes the distribution of Eurasian water milfoil in the Menominee River watershed. The penultimate section, "The Question of Control" asserts that at present Eurasian water milfoil is "in control" at the Little Q Project and reviews information that recommends caution regarding herbicide control at the Little Q Project. Finally, the "Adaptive Management Approach" section addresses the scientifically defensible approach to Eurasian water milfoil in the Little Q Project in the context of "adaptive management."

Background

White Water Associates, Inc. (White Water) is an independent ecological consulting firm headquartered in the western Upper Peninsula within about 50 miles of the Little Q Project. We work extensively with aquatic and wetland ecosystems in Michigan and Wisconsin. We have conducted 17 consecutive years of ecological and water quality studies on the Little Q Project (beginning in 1989). In fact, the White Water field biologist (David Tiller) who conducts the Eurasian water milfoil monitoring at the Little Project began work on that system in 1989. Few field scientists have that kind of long-term experience and perspective on this part of the Menominee River.

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As a general practice, White Water (corporately) and David Tiller (personally) are not averse to using herbicide application to address non-native or aggressive plant populations. For example, a White Water project initiated and supervised by Tiller undertook the control of the glossy buckthorn (*Rhamnus frangula*) on a site in Escanaba, Michigan where this plant has come to absolutely dominate most of the surrounding wetlands. In this case, White Water engaged a licensed applicator (Asplundh) and used the herbicide Garlon®. White Water also recommended using herbicide for purple loosestrife located in the City of Niagara and near the access site that Stora Enso created on the Little Q Project. As a life-long gardener, David Tiller cautiously uses herbicides such as Roundup® (containing the active ingredient glyphosate) and Princep® (containing the active ingredient simazine) to control weeds.

Human beings have a history of looking to solve problems with a "silver bullet" and many candidates have not delivered as promised (or intended). At the time of its introduction, DDT was touted as miracle. Now banned in the U.S, it was directly related to the decline of several bird species because of unforeseen bio-accumulation that caused egg shell thinning. This kind of unintended consequence often put humans in the position of looking back and wondering how we might have done better. White Water advocates a scientific and cautious approach to managing non-native species such as Eurasian water milfoil, emphasizing the least aggressive means first unless conditions demand otherwise.

Little Q Status

White Water has conducted monitoring for Eurasian water milfoil on the Little Q Project since 1998. Each year our findings are submitted to Stora Enso or its predecessors. Our surveys have been thorough systematic investigations of the approximately 450-acre impoundment (approximately 4.5 river miles of the main channel and numerous bays) using boat and kayak to access all navigable habitats. We have sent plant specimens to outside experts for verification of identification (using both traditional morphological taxonomic methods and genetic analyses). In this section we review and summarize the results from the monitoring program.

Eurasian water milfoil was first documented in 2002 by our observation of a few individual plants at two discrete locations. In 2003, the species was found at only one location, having disappeared from one site and continuing at the other. In 2004, we reported Eurasian water milfoil at seven discrete locations. Finally, in 2005 we reported it at only three locations. Only one location has been observed to harbor Eurasian water milfoil in all four years of monitoring since it was found in 2002. This area is on the Wisconsin side of the Menominee River, across the river and nearly due south from the mouth of Fumee Creek. One of the current documented sites (observed with Eurasian water milfoil in 2004 and 2005) is not part of the natural river system, but in a man-made canal near a residential development that is not part of the FERC project boundary. All locations where Eurasian water milfoil has been found have been small areas containing small numbers of individual plants (in some cases a single plant). As of the 2005 monitoring, we have not observed beds or colonies of Eurasian water milfoil.

In 2003, we carefully checked the two locations where Eurasian water milfoil was first found in 2002. Both backwaters were quite dry consisting of exposed muck flats

with drying algae on the surface. Eurasian water milfoil disappeared from the most upstream site where it was observed in 2002, but remained at the downstream original site. In one location we found no individual plants. We reported that there was no visual indication that the Eurasian water milfoil had spread in extent.

We stated in the 2003 monitoring report that research is ongoing in New England and Wisconsin to determine if apparent infestations of Eurasian water milfoil are actually hybrids of the alien *M. spicatum* and a native species such as *M. sibiricum*. Many eastern and midwestern lakes that have problem invasive levels of what was believed to be Eurasian water milfoil have been found in fact to be dominated by the hybrid. Further, lakes where the hybrid is present almost always lack the native *M. sibiricum* as well as a pure form of the non-native Eurasian water milfoil (*M. spicatum*). At that time, the data indicated that the hybrid form may be more widespread than previously known and may be more invasive than the pure form.

Concerned about the possibility of a hybrid population in the Little Q Project, in 2002 we sent several specimens of the identified Eurasian water milfoil along with samples of both native water milfoil species (*M. sibiricum* and *M. heteropyllum*) to experts Drs. Donald Les and Michael Moody of the University of Connecticut for further identification by genetic analysis. Their analysis of our specimens from the Little Q Project indicated that no hybrids were present, only the pure form of Eurasian water milfoil and pure forms of *M. heterophyllum* and *M. sibiricum*. This was hopeful news because it was possible that the pure Eurasian water milfoil in the project area was less likely to spread than if the hybrid was present.

In 2004, we found Eurasian water milfoil at seven locations within the project area. These locations were fairly shallow backwaters with little current. Four of the new 2004 locations were upstream of the single patch present in 2003 suggesting that new introductions likely occurred from upstream propagule sources. Twin Falls Flowage (the next flowage upstream) has had records of Eurasian water milfoil since 1995. In 2004, we reported that the lone site where Eurasian water milfoil was recorded in 2002 and 2003 did not exhibit any increase in plant abundance. In fact, it may have been slightly less abundant in 2004 than in previous years. In this location, Eurasian water milfoil was still part of a mixed community of native aquatic species that included *Potamogeton foliosus*, *Utricularia vulgaris*, and *Ceratophyllum demersum*. In the other locations observed in 2004, most of the plants were present as individual scattered plants mixed with other species. We reported that at this point, Eurasian water milfoil does not appear to be "taking over" the locations in which it was found.

In 2005 we found Eurasian water milfoil at only three sites. The most upstream occurrence consisted of a single floating, unattached plant. A few individual plants were observed mixed with other native aquatic plants in the constructed canals near the development (outside of the project area). Finally, we observed individual plants in the area where Eurasian water milfoil has been consistently observed in 2002, 2003, and 2004. Again we reported that at this point, Eurasian water milfoil does not appear to be "taking over" in any of the locations in which it has been found.

We respectfully disagree with the MDNR's contention that the reported information about Eurasian water milfoil in the Little Q Project is "insufficient" and "irrelevant" to the question of control by herbicides (see the MDNR January 3, 2006 letter to Stora Enso regarding the Little Quinnesec Falls Eurasian water milfoil Control

Plan). White Water has documented several findings that are absolutely germane to management of the non-native plant: (1) where observed, the number of Eurasian water milfoil plants are few; (2) the locations where Eurasian water milfoil plants have been observed are very small in surface area, (3) where observed, the individual Eurasian water milfoil plants are interspersed within a very diverse and dense native aquatic plant community; (4) over the years of monitoring the small, sparse populations of the plant appear and disappear (with the exception of one site); (4) nowhere in the Little Q Project has Eurasian water milfoil established a foothold that indicates it will thrive or dominate the vegetation; (5) at least as of 2002, the Eurasian water milfoil present was the pure form, not a more vigorous hybrid; and (6) we know the year that Eurasian water milfoil first was found in the Little Q Project and the annual distribution of locations within the impoundment. It is rare indeed to have this kind of information when planning a course of management for a non-native species.

Also of great importance to the management of Eurasian water milfoil at the Little Q Project is the distribution and density of the population. The instances of Eurasian water milfoil at the Little Q Project can hardly be called "colonies" and they most certainly are not pure patches or beds of the species. Instead, individual plants are dispersed within diverse beds of native aquatic plants. This has been clearly stated in every annual monitoring report since the species was discovered. At this point in time, descriptors such as "relative size of the E. milfoil colonies" and "percentage of surface water covered" do not apply to the small population of Eurasian water milfoil that is completely interspersed within a diverse community of native plants in the Little Q Project. In fall of 2005, the MDNR asked us for a surface area coverage of Eurasian water milfoil in the Little Q Project and we responded by saying that collectively it was "probably less than an acre" meaning that over this extensive flowage the amount of Eurasian water milfoil was very small[1].

We address the question of management in a later section. The next section characterizes the extent of Eurasian water milfoil in the Menominee River watershed.

Menominee Watershed Status

The MDNR states in their January 3, 2006 letter that (besides the Little Q Project), "the Twin Falls Flowage (FERC #11831) is the only other hydroelectric project on the Menominee River where Eurasian water milfoil has been identified." Despite this statement, Eurasian water milfoil is certainly "upstream" of this portion of the Menominee River. In this section we provide some examples of this distribution.

During 2005, while working on the Brule Dam Impoundment (FERC Project #2431) during a water level draw-down, David Tiller observed a substantial amount of Eurasian water milfoil. Robert Gussert (Administrator of the Iron County Conservation District) independently observed Eurasian water milfoil in the Brule Dam Impoundment during late 2005 when the impoundment was refilling. Gussert reported that large amounts of fragmented Eurasian water milfoil were observed floating down the river.

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[1] *Even using the estimate of less than 1 acre, this translates to less than 0.2% of the area of the Little Q Project.*

Eurasian water milfoil has been reported from the Spread Eagle Chain of Lakes at Spread Eagle, Wisconsin. Lake Antoine in Iron Mountain, Michigan has Eurasian water milfoil (as well as zebra mussels). Both these water bodies have direct connections to the Menominee River system upstream of the Little Q Project.

In Iron County, Michigan, Robert Gussert has recorded Eurasian water milfoil in the Crystal Falls Impoundment (on the Paint River – a tributary to the Menominee upstream of the Little Q Project). In Dickinson County, Michigan, Ann Hruska (Coordinator of the Fumee Lake Watershed Project, Dickinson County Conservation District) has recorded heavy infestations of Eurasian water milfoil in Cowboy Lake (Kingsford), Badwater Lake (north edge of Iron Mountain), the Menominee River between Cowboy Lake and Badwater Lake. All of these locations are upstream of the Little Q Project and obvious sources of Eurasian water milfoil introductions.

Eurasian water milfoil is unfortunately distributed throughout the Menominee River watershed. At this point in time its eradication from the watershed is a virtual impossibility. The best that can be hoped for is that it will stay "under control" in those aquatic ecosystems where it exists and that its dispersal into new aquatic ecosystems can be slowed and minimized.

The Question of Control

In their January 3, 2006 letter to Stora Enso, the MDNR mischaracterizes Stora Enso's position in stating that the company claims that control of Eurasian water milfoil is unnecessary. The more accurate characterization is that Stora Enso believes that the current population of Eurasian water milfoil in the Little Q Project is not out of control. Stora Enso believes that the unavoidable disturbance caused to native species by application of the herbicide 2,4-D could very easily open up new areas and opportunities for Eurasian water milfoil to colonize. This position is supported by the common experiences and knowledge of professionals that work with invasive species control. That experience is that disturbances or disruption to the balance of native systems is an invitation for invasive species to move in. In the case of Eurasian water milfoil, seasonal timing in herbicide application will help minimize unintended damage to other plants, but native species will be impacted. Once established, Eurasian water milfoil cannot be effectively eradicated from any aquatic system (lentic or lotic). Small lakes that have been heavily treated still end up with a few surviving scraps of plant material that serve to continue the population (perhaps even create a population more resistant to herbicide). A recent Lake Tides article (attached to this letter as Attachment A) discusses the effectiveness of whole-lake herbicide treatments. In a large river system such as the Menominee, the upstream propagule sources are very numerous.

Experiences with Eurasian water milfoil in Wisconsin are instructive for the Little Q Project. For example, an article in the Fall 2005 issue of "Lake Tides" (a publication of the University of Wisconsin Extension) by Craig Roesler (WDNR Water Resources Management Specialist) describes a chain of lakes in Price County on the Elk River that was heavily infested with Eurasian water milfoil. The city of Philips wanted to draw the system down over winter to kill the milfoil. Before doing the draw-down, Roesler surveyed the area and found very little Eurasian water milfoil remaining (a 90% reduction). His conclusion was the native milfoil weevil, *Euhrychiopsis lecontei* had

decimated the Eurasian water milfoil population. The draw-down has been put on hold. There was also concern that a draw-down could negatively effect the weevil population. Roesler concluded the article by saying "More observation will take place over the next few summers to see if the weevils' effectiveness continues in the fight against EWM." The Lake Tides article is attached to this letter as Attachment B).

In preparation for writing this review, we interviewed several resource managers in Wisconsin and Michigan with experience with Eurasian water milfoil. Their comments regarding control measures for Eurasian water milfoil with respect to the Little Q Project are captured in the following bullets.

- Bob Korth, University of Wisconsin Extension Lakes Specialist and and co-author of Through the Looking Glass (a book on Wisconsin's aquatic plants) felt it "would be ill advised to use chemicals at this time" on the Little Q Project. He suggested a diver could be hired to pull the few plants that are there. Korth also indicated that he knew of no instances where Eurasian water milfoil has been eradicated from a lake with any herbicide. Several years may go by without evidence but it always returns. Korth added added that no long term studies have been done with herbicides such as 2,4-D and Floridone and the few studies that have been initiated have been by the chemical manufacturers themselves.

- Laura Herman (University of Wisconsin Extension Citizen Lake Monitoring Network Educator and former WDNR Aquatic Plant Management and Protection Coordinator) explained that Wisconsin has decreased the use of herbicides for Eurasian water milfoil and recommends their use only when other options are not working or heavy infestations need to be "knocked back." She stated that if herbicides open up areas in the native plant community, Eurasian water milfoil would surely move in. Herman said that 2,4-D very early in the season will miss most native plants but some damage to natives will likely occur. She is a strong proponent of the milfoil weevil, *E. lecontei*, and thought that if native species of milfoil are present it is likely that the weevils are present as well. She also mentioned mechanical removal with the use of a scuba diver if the water is clear enough to see and a garden rake if the water is shallow enough to reach the bottom.

- Craig Roesler (WDNR Water Resources Management Specialist) stated that moving water systems (rivers and riverine impoundments) would make application of herbicide difficult. To be effective the target plants must be exposed to a herbicide for a sufficient length of time (48 hours for the herbicide 2,4-D). Achieving that time may be difficult when water movement transports the herbicide downstream. Roeseler also felt that with scattered plants and no real beds of Eurasian water milfoil, using an herbicide was unwarranted.

- Bob Martini (WDNR Rivers Team Leader overseeing Wisconsin's 84,000 miles of rivers and streams) with reference to the Little Q Project, stated that "I think control is warranted but not chemical control at this time. It seems to me that native plant damage potential outweighs the value of chemical control in this

situation. I think monitoring for weevils, hand pulling, weevil introduction, and watching the stand are prudent measures at this time."

- Ann Hruska (Coordinator of the Fumee Lake Watershed Project, Dickinson County Conservation District) thought it would nearly impossible to spray 2,4-D at the Little Q Project as has been suggested by the MDNR. She thought a granular application placed next to plants may work but most of the herbicide would probably flow away before it had a chance to take effect.

These five professionals advocated a cautious approach when it comes to controlling Eurasian water milfoil with herbicide application. In the final section we suggest that an adaptive management approach is a practical and prudent model to follow in the case of the Little Q Project.

Adaptive Management Approach

An adaptive management process[2] is the often most appropriate model to use in aquatic resource management, especially those situations where a non-native invasive species is being managed. In adaptive management, a plan is made and implemented based on best available information and well-defined goals and objectives. Outcomes of management actions are monitored to ascertain whether they are effective in meeting stated goals and objectives. Based on this evaluation the plan is "adapted" (modified) in a process of continuous learning and refining.

Adaptive management acknowledges uncertainty. Because natural systems are so diverse, so complex, and so variable, almost all management actions will have uncertain outcomes. This is especially the case when it comes to applying chemical controls on species. Unintended negative outcomes are possible. Monitoring is crucial in adaptive management. Adaptive management uses information from monitoring to continually evaluate and refine management practices. Monitoring measures the success of management actions. Well-designed monitoring should indicate how effectively management actions are working and give new insights into ecosystem structure and function. Monitoring should provide needed information to adapt management goals.

We completely understand the MDNR's position of wanting to be "pro-active" and taking action on Eurasian water milfoil in the Little Q Project while the problem is still small. This is a circumstance, however, where this logic is inappropriate. Looking at the big picture of the Menominee River Watershed, why herbicide a section of the river in which the current population has not demonstrated any trend toward aggressive expansion of population size or distribution? If an aquatic habitat with extensive Eurasian water milfoil were treated and brought to the level that currently exists in the Little Q Project, it would be considered a tremendous success. Considering that many upstream locations have larger populations of Eurasian water milfoil, the approach to control needs to be broader. Certainly, using herbicide within a diverse native plant community in an attempt to affect a very few plants seems too risky at this point in time.

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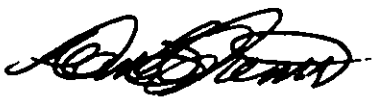
[2] *Walters, C. 1986. Objectives, constraints, and problem bounding. In W.M. Getz, ed., Adaptive Management of Renewable Resources. Macmillan Publishing Company. New York. p. 13+.*

Other less risky approaches (such as removing plants using SCUBA) should be conducted first with appropriate monitoring to determine effectiveness of the approach as well as any changes in the Eurasian water milfoil population at the Little Q Project. Monitoring should also determine whether weevil herbivory is occurring on the Eurasian water milfoil in the Little Q Project.

Sincerely,



Dean Premo, Ph.D.
Certified Senior Ecologist

and

David Tiller, B.S.
Field Biologist

Attachment A

Lake Tides
The newsletter for people interested in Wisconsin lakes

Getting It Right

Whole-Lake Herbicide Debate Deserves a Dose of Science

If you have read the papers lately, you may have noticed that lakes are in the news! Headlines from the Wisconsin State Journal this summer read:

"Why not try magic potion on our lakes?" (7/17)
"We won't save lakes by playing it safe" (7/19)
"DNR wary of fluridone to clear lakes of weeds" (7/22)
"Lake problems defy simple solutions" (7/31)
"Board member pushes for study of lake weed herbicide" (8/11)
"Herbicide can kill lake weeds safely" (8/14)
"For lakes cleanup, think big" (8/19)

Lake Tides *asked the DNR Research Team to explain the "ins and outs" of whole-lake treatments.*

People have long been interested in managing aquatic plants in their lakes, and few plants have attracted as much concern as the invasive Eurasian watermilfoil. Recently, a new management technique is sparking intense debate.

The subject of the debate is, as you may have guessed, whole-lake herbicide treatments for Eurasian watermilfoil (EWM). The pesky plant is now present in over 400 Wisconsin lakes. Given the rising concern over its presence and distribution, debating proper control methods is important. Unfortunately, misinformation seems to abound, making the discussion less productive than it could be. Fluridone is the chemical proposed to apply to entire waterbodies to treat EWM. The active ingredient is 1-methyl-3-phenyl-5-[3-(trifluoromethyl)phenyl]-4(1H)-pyridinone, and is marketed under the trade names Sonar® and Avast!® As part of the DNR's Lake Research Team, we have reviewed the effects of whole-lake fluridone treatments in Wisconsin and throughout the country. To help foster a discussion that balances sound science with ecological, social, and economic value, we'd like to clarify six common assumptions:

Assumption #1. Eurasian watermilfoil has taken over our lake!

First, you should "know your plant," particularly where and how much EWM is present. The first step in choosing an appropriate aquatic plant management plan is to conduct a good quantitative aquatic plant survey. You can check out DNR's

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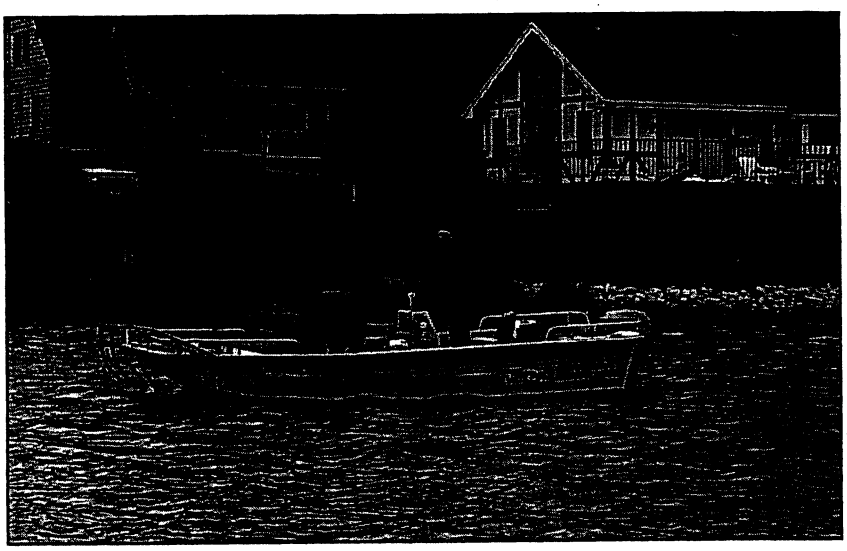

Photo provided by Wisconsin Department of Natural Resources

Fluridone is typically applied through subsurface injection with hoses that drag in the water.

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Wisconsin Lakes Partnership

Not a single lake in the country has ever received a whole lake treatment that has truly eradicated EWM.

plant sampling protocol at: http://www.uwsp.edu/cnr/uwexlakes/ecology/APM/APM%20Appendix.pdf. Accurate quantitative plant surveys are important because perception and memory can be inaccurate. Since EWM is often the only plant visible at the surface, it may only appear to have "taken over." EWM tends to become dominant in disturbed eutrophic lakes, but in other lakes it may be present for decades and never reach nuisance

levels. Surveys will let you know: 1) how much EWM is really there; 2) where it is present; and 3) what other species are there as well. This information will allow you to choose a tool that is appropriate for the scope of the EWM infestation while minimizing the impact on native plants. You can also track the success of any plant management actions by following the same survey protocol for multiple years.

Assumption #2. Fluridone is just another herbicide – it's "proven" to be safe for people and the environment.

There is a key difference between how fluridone and other aquatic herbicides (e.g., diquat, endothall, 2,4-D) are used – namely, the size of the area they are used to treat. Unlike conventional treatments used to deal with portions of lakes ("spot treatments," usually 10 acres or less), the liquid formulation of fluridone must be applied at the whole-lake scale. Active concentrations of fluridone (greater than four parts per billion) must be maintained for approximately 60+ days throughout the entire surface layer of the lake for it to be effective on EWM. Because of the long contact time required, it may be impractical to treat some flowages and drainages because the chemical is lost through the outlets.

So what is the problem with treating whole lakes?

Prior to issuing a permit for a chemical application, the Wisconsin DNR is required in its aquatic plant rules (NR 107) to be reasonably certain that the application will avoid: 1) a hazard to humans, animals or other non-target organisms; 2) a significant adverse effect on the body of water; 3) significant injury to fish, fish eggs, fish larvae, essential fish food organisms or wildlife, either directly or indirectly through habitat destruction; 4) areas containing threatened or endangered species; and 5) significant negative effects on native vegetation in sensitive areas. To the best of our knowledge, there are no toxic effects of fluridone to humans or animals when applied according to label instructions. [As is the case with any herbicide, it is impossible to test every life stage of every potential organism, every potential mode of exposure (consumption, skin, aerosol), and every by-product along the process of degradation, over both the short and long term. Careful consideration should include evaluating the known beneficial and negative impacts of chemicals applied to surface waters, in addition to recognizing potential undocumented effects.]

Both positive and negative ecological effects accompany an herbicide treatment of any size. Positive effects include temporary control of exotic species. Negative effects may include die-offs of native vegetation, increases in green algae and/or cyanobacteria (blue-green algae), and effects on invertebrates and fish through loss of habitat and potential changes to oxygen profiles (possibly resulting in fish kills).

With small-scale treatments, negative effects are limited to the treatment zone, allowing susceptible species to survive elsewhere in the lake. With a whole-lake treatment, however, the entire lake ecosystem is exposed to the herbicide. Because of this, it is crucial to systematically evaluate the benefits and risks associated with treatment.

Assumption #3. Fluridone is widely used and well-studied.

A scientist's best source for reliable, unbiased information is an article in a peer-reviewed scientific journal. We started there to understand the efficacy and risks associated with whole-lake fluridone treatments. Unfortunately, we found only three peer-reviewed articles that dealt with effects on EWM and plants, zero that dealt with effects on water clarity, and three that focused on select aspects of fish biology - very few, considering these treatments occur on whole lakes! There also were no long-term studies (greater than five years). Because of the limited published information, we also contacted 30 states for unpublished monitoring data.

How widespread is the use of fluridone for whole-lake treatments? Ten states confirmed using fluridone for whole-lake chemical treatments for EWM or hydrilla (another invasive aquatic plant in the southern U.S.) within the past 10 years. In two states, whole-lake treatments are relatively common; Florida allows approximately 80 per year, and Michigan allows approximately 20 per year. Most other states have allowed experimental treatments on only a limited number of lakes (e.g., Wisconsin - 4 total, Minnesota - 8, Iowa - 6, Vermont - 4, Indiana - 4, Oregon - 2, Maine - 1). Due to research that demonstrates negative effects of whole-lake treatments on native vegetation and water clarity, the Minnesota DNR generally prohibits whole-lake treatments, especially on eutrophic lakes.

Assumption #4. Whole-lake herbicide treatments eradicate EWM.

Not the case! Not a single lake in the country has ever received a whole-lake treatment that has truly eradicated EWM. Successful treatments do significantly reduce EWM for 1-3 growing seasons, often crashing to near zero the year of treatment. However, it always returns. In years following initial treatment, manual methods or small-scale chemical treatments are employed to manage EWM as it recovers. Without repeated whole-lake treatments, EWM eventually returns to pretreatment levels, often expanding rapidly during a single season. Return of EWM in treated Midwestern lakes appears to be from roots or seeds remaining in lake sediments after treatment, not from new introductions at obvious entry points like boat launches.

With a whole-lake treatment, the entire lake ecosystem is exposed to the herbicide.

Assumption #5. Whole-lake herbicide treatments are "selective" and do not affect native plants.

How fortunate we would be if that statement were true! However, many native plants are killed by fluridone. Susceptible native plants include: coontail, elodea, naiads, northern watermilfoil, certain water lilies, some duckweeds, bladderwort, seven of the *Potamogeton* pondweeds, and water stargrass. If together these species comprise a large proportion of the local plant community, fluridone's effect on native lake vegetation will be drastic. If present, fluridone-tolerant plants like chara or wild celery may increase as long as competition from EWM is absent. However, it is only a matter of time before EWM returns to again outcompete these tolerant plants. In the meantime, some susceptible species return, while others may not.

Assumption #6. Whole-lake herbicide treatments never cause algae problems.

Herbicides are intended to kill plants. By killing plants, we can open the door to other lake problems. To understand the ecological relationships that will help us predict the effects of fluridone, let's review a little lake biology. Primary production in lakes (the conversion of carbon dioxide and energy from the sun to organic carbon and oxygen) is carried out by three interacting (and competing) communities of a lake's ecosystem – plants, algae, and certain types of bacteria.

Aquatic Plants, or "weeds," are macroscopic, and usually rooted in

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In our review of whole lake treatments, we found significant decreases in water clarity following 80% of the treatments.

sediments. Plants provide valuable ecological services. By competing for nutrients, they limit the growth of algae and cyanobacteria and improve water clarity. They also stabilize sediments, preventing shoreline erosion, and provide critical habitat to many organisms (including fish).

Algae are highly variable. They can be either microscopic or macroscopic, made up of single or multiple cells, and may grow free-floating or attached to a substrate. Along with plants, algae serve as the base of the food web in lakes. Growth of algae increases with increasing nutrients. High abundance of algae makes the water appear greener and become less clear.

Bacteria are microscopic. We are often concerned with certain groups of bacteria called cyanobacteria (blue-green algae). Like other algae, cyanobacteria increase under favorable environmental conditions such as increased levels of phosphorus, reducing water clarity. Increases in some species result in significant odors. Certain species of cyanobacteria may also be toxic.

Photo provided by William Jones

Preparing for chemical application

Because each of these primary producers uses nutrients, it is important to understand that a management action aimed at decreasing plants (like whole-lake herbicide treatments) leads to increased nutrients available for algae and bacteria. Decaying plant material also releases additional nutrients (like compost) that algae and bacteria may use for growth. Large-scale die-offs of vegetation may result in "blooms" of algae and cyanobacteria (potentially causing fish kills, odors, and toxins). Large-scale decreases in plants also result in a significant alteration in habitat for invertebrates and fish. A lack of nearshore aquatic plants may facilitate faster erosion from wave action along susceptible shorelines.

So what about clear water?

In our review of whole-lake treatments, we found significant decreases in water clarity following 80% of the treatments. In most, water clarity was deacreased by 50%. The water quality response can be predicted based on three factors unique to each lake: 1) the amount of susceptible vegetation killed; 2) external and internal nutrient loads; and 3) physical characteristics of the lake (primarily the percentage of the lake area that is occupied by plants). It is most likely that extreme reductions in water clarity will occur in shallow, eutrophic lakes that are dominated by EWM and other susceptible plants. A deep, oligotrophic lake, with high abundance of fluridone-tolerant natives is less likely to be impacted by algae after treatment.

A magic potion?

Are whole-lake herbicide treatments a quick-fix to our long-term EWM problem? Like anything that sounds too good to be true, we have yet to discover a "magical potion." However, using science and informed discussion, we can systematically evaluate the benefits and costs associated with various management techniques including reasonable expectations of EWM nuisance relief, and anticipated effects on other aspects of a lake ecosystem. If you are considering a whole-lake treatment on a lake you care about, ask questions and demand answers of the treatment advocate. As a smart consumer, seek answers from multiple sources, not just from parties with an economic interest in your decision. In many cases, the honest answer may be a humble, "There are no answers yet." For example, as tempting as it is to assume no harm, the long-term effects of fluridone on fisheries are entirely unknown. It is no easy task to balance the ecological risks and benefits with the economic costs of different management options within the array of social values represented by the public trust. But without good science, a whole-lake treatment may turn into a whole-lake mistake.

by Jennifer Hauxwell, Kelly Wagner, and Alison Mikulyuk
Wisconsin Department of Natural Resources

Attachment B

Milfoil Control
Let Nature Take Its Course?

The Phillips Chain of Lakes, made up of Duroy, Elk, Long, and Wilson Lakes, is located adjacent to the city of Phillips in central Price County. The invasive and problematic Eurasian watermilfoil (EWM) was first found in Duroy Lake in the fall of 2000. By 2002, all four lakes contained EWM. Duroy contained extensive beds, Wilson contained smaller scattered beds, and Elk and Long contained very small, scattered beds.

There had been no introduction of weevils made on the Phillips chain, so the native weevils present simply adapted to feeding on EWM.

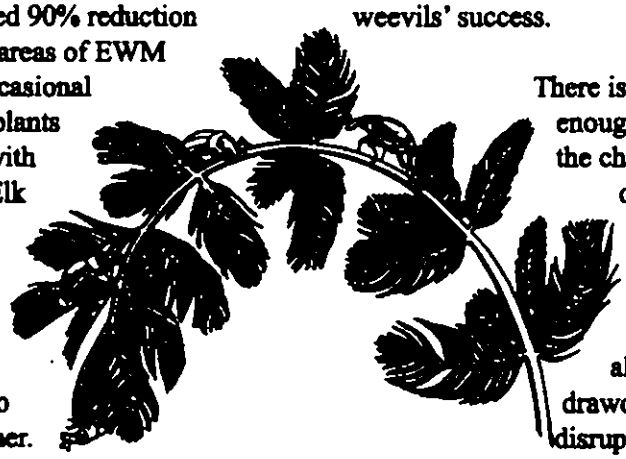
In 2005, concerned about the amount of EWM in the lakes, the Phillips Chain Lake Association requested an over-winter drawdown to reduce the invasive plant in the chain. In response, Craig Roesler and Dan Kephart of the DNR performed an assessment with assistance from lake association volunteers.

Surprisingly, the assessment revealed the EWM population had declined substantially since 2002. Duroy Lake showed a major decline, with an estimated 90% reduction in visible plants. Large areas of EWM beds were reduced to occasional plants. Most surviving plants were heavily damaged with few remaining leaves. Elk and Long Lakes had hardly any EWM. In Wilson Lake, the declines ranged from almost total destruction of plants in one bed to no obvious impacts in another.

What was happening in the lakes to reduce the EWM populations? Upon examination of the damaged plants, evidence showed that the milfoil weevil, *Euhrychiopsis lecontei*, was hard at work. Numerous adult weevils were found and many of the damaged EWM stems showed the blackened stem segments caused by larval feeding.

Milfoil weevils are about 3 mm or 1/8 inch long. They are naturally present in most Wisconsin lakes that contain native milfoils. There had been no introduction of weevils made on the Phillips chain, so the native weevils present simply adapted to feeding on EWM. Up to now, milfoil weevils had shown significant impacts to EWM in a very small percentage of lakes. The reasons they are unsuccessful in most lakes are uncertain, although predation by abundant bluegills has been shown to be one factor. The extent of the weevil impact to EWM in the Phillips chain appears to be greater than that reported in any other lakes where impacts have been observed.

The lakes of the Phillips chain have dark waters, heavily stained from wetland drainage. They also are eutrophic and experience significant summer algae blooms. EWM is only present in water depths ranging from 2.5 to 5 feet. It is unknown whether these conditions may have contributed to the weevils' success.



There is probably not enough EWM left in the chain to justify a drawdown and consequently, the technique has been put on hold. There was also concern that a drawdown could disrupt the booming weevil population and have other negative consequences. What's next in this weevil vs. EWM saga? More observation will take place over the next few summers to see if the weevils' effectiveness continues in the fight against EWM.

by Craig Roesler
Wisconsin Department of Natural Resources