Appendix A

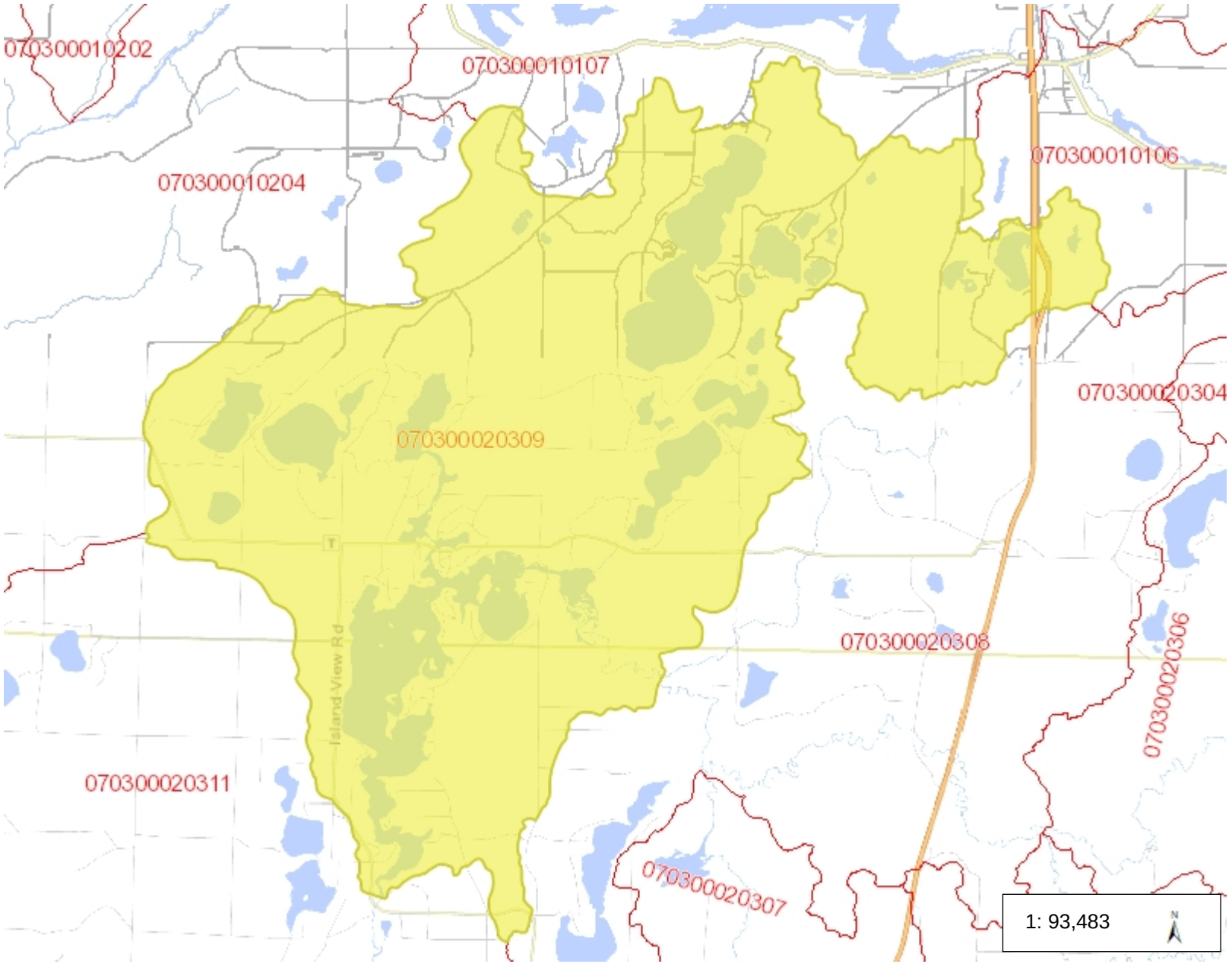
Stakeholders Meeting Agendas and Minutes

This Appendix has been split into three separate documents due to size.

Appendix B

Minong Flowage Subwatershed, Totagatic River Basin, and Namekagon River Watershed Maps

Minong Flowage - Totagatic River Subwatershed



Legend

- 12-digit HUCs (Subwatersheds
- Rivers and Streams
- Open Water

1: 93,483

Notes

3.0 0 1.48 3.0 Miles

NAD_1983_HARN_Wisconsin_TM

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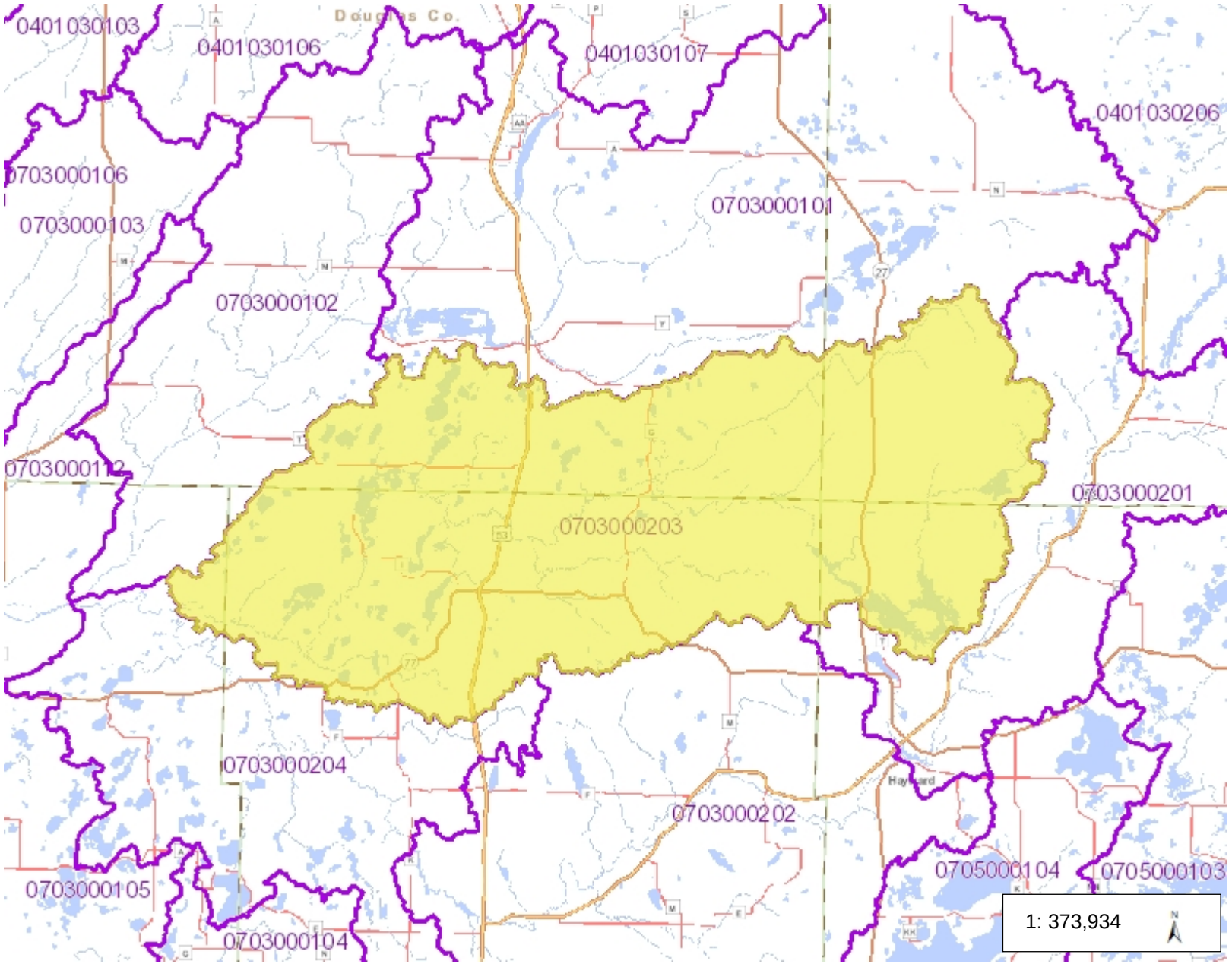
Totagatic River Watershed



Legend

- 10-digit HUCs (Watersheds)
- Rivers and Streams
- Open Water

1: 373,934

Notes

11.8 0 5.90 11.8 Miles

NAD_1983_HARN_Wisconsin_TM

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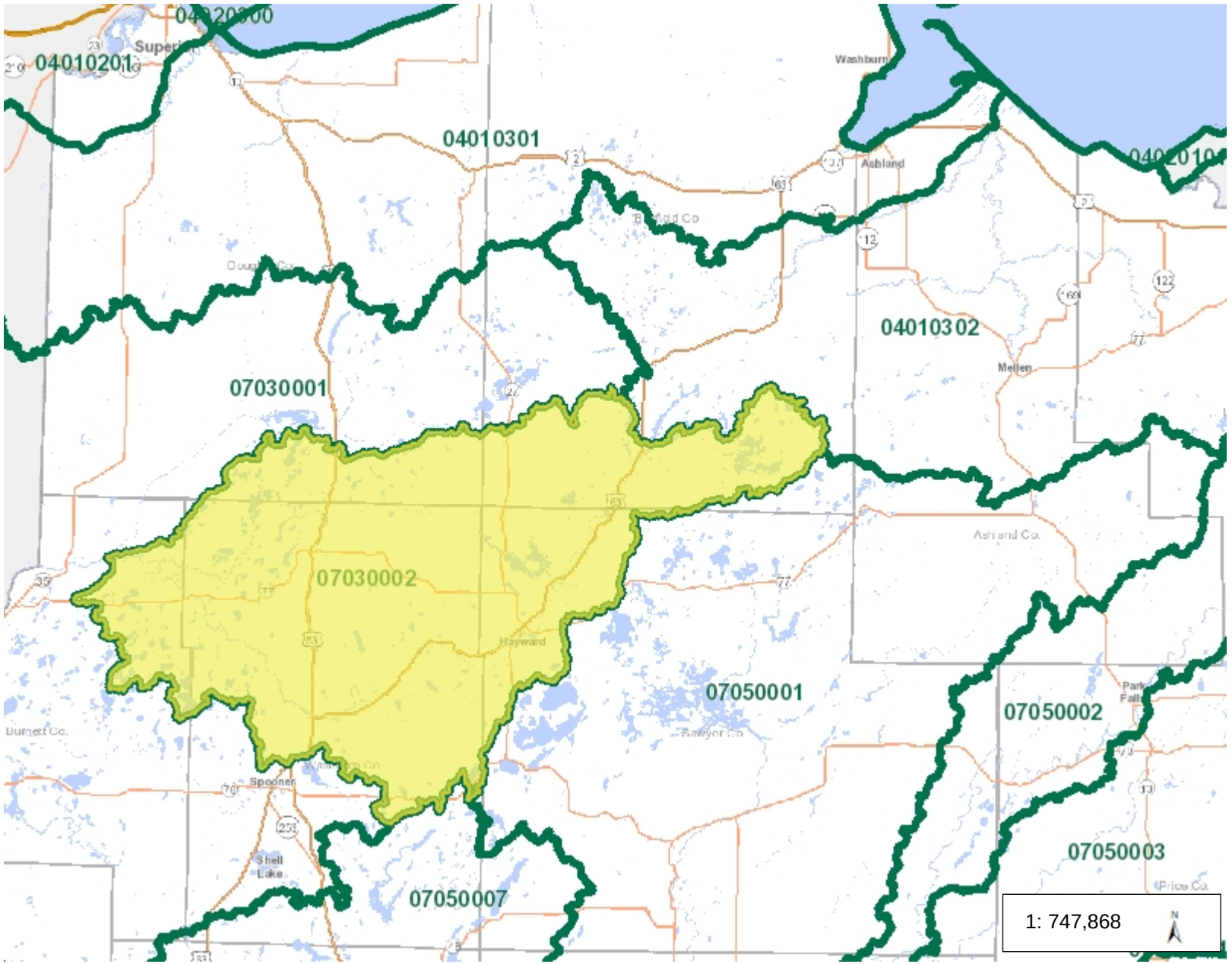
Namekagon River Subbasin



Legend

- 8-digit HUCs (Subbasins)
- Rivers and Streams
- Open Water

1: 747,868

Notes

23.6 0 11.80 23.6 Miles

NAD_1983_HARN_Wisconsin_TM

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Appendix C

Tribal Donation of Navigate Herbicide

St. Croix Chippewa Indians of Wisconsin

24663 Angeline Avenue • Webster, WI 54893 • (715) 349-2195 • Fax (715) 349-5768

To: Minong Flowage Lake Association

The St. Croix Tribal Natural Resources Department has agreed to donate twelve (12) bags of the aquatic herbicide "Navigate" to the Minong Flowage Lake Association. Each bag contains 50 lbs of the herbicide. It is our knowledge that this donation will be used solely with-in the wild rice beds on the Minong Flowage for the treatment of Eurasian milfoil.

Upon the exchange of the bags, all legal liability of application, storage, and the proper disposal of material will be the responsibility of the Minong Flowage Lake Association. Any deviation of label instructions is the responsibility of the Minong Flowage Lake Association.

The St. Croix Tribal Natural Resources Department would like to acknowledge the work that the Minong Flowage Lake towards the protection and enhancement of wild rice.

Thank you.

David L Blaine — 4/6/2010

Lake Association Representative — Date

4/6/2010

Tribal Natural Resources Representative — Date

Lewis Taylor, Chairman, Sand Lake
Beverly Benjamin, Vice-Chairwoman, Danbury
David Merrill, Secretary/Treasurer, Round Lake
Jeanne Awonohopay, Representative, Maple Plain
Elmer J. Emery, Representative, Sand Lake

Received Time Apr. 8. 2010 11:52AM No. 0704

Appendix D

WDNR Letter Regarding 2011 Treatment

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
Northern Region Headquarters
810 W. Maple Street
Spooner WI 54801

Scott Walker, Governor
Cathy Stepp, Secretary
John Gozdzialski, Regional Director
Telephone 715-635-2101
FAX 715-635-4105
TTY Access via relay - 711

WISCONSIN
DEPT. OF NATURAL RESOURCES

May 26, 2011

Mr. James E. Zorn, Executive Director
Great Lakes Indian Fish and Wildlife Commission
P.O. Box 9
Odanah WI 54861

Dear ~~Mr. Zorn~~ Jim:

The Department appreciates the input of the Voigt Task Force members and especially the St. Croix Tribe on the proposed Aquatic Plant Management Permit for herbicide treatment of Eurasian Water Milfoil in the Minong Flowage. We understand and respect your concerns and your reasons for not endorsing this chemical treatment.

We share your concerns about use of herbicides in our waters, and because of that, we only allow this method of plant control in specific instances, and particularly for the control of invasive species (similar to the approach on projects undertaken by tribal Natural Resource Departments). We also share a mutual goal for protection of wild rice and other native plants.

The 3-year aquatic plant management project for the Minong Flowage has been a very carefully planned approach to tackle the Eurasian Water Milfoil problem, and protection of wild rice has always been in the forefront of this planning process. At this flowage, we are very concerned about Eurasian Water Milfoil areas expanding and encroaching into the wild rice beds in Serenity Bay. We also feel neighboring lakes are vulnerable to infestation from plant fragments that can be carried out of the flowage on boats and trailers. In fact, Mud and Rice Lakes are listed as wild rice waters.

After weighing the issues raised, we have decided to approve the permit for this year's treatment, for the following reasons:

- Chemical treatment may be the most effective tool at present. Because of the extent of the growth of invasive milfoil and the shallow water in Serenity Bay, physical harvesting is not a viable option. Also, biological control through insect predation is not advanced enough at this time to assure suppression in this setting.
- This spring's project is the third application in a 3-year course of treatment, designed as part of the approved Minong Flowage Aquatic Plant Management Plan. We support completing this year's application to see how effective this overall project has been in gaining control of a long-term, established infestation. Information collected can also give us a better idea of how to deal with large infestations in other lakes across the state. After this season, the Minong Flowage Aquatic Plant Management Plan must be reviewed and updated before further plant control permits are issued.
- We considered switching to a fall application, but feel spring application will be more effective. In spring the chemical can be applied to actively-growing milfoil foliage and the amount of plant biomass is relatively low. If chemicals are to be used, it is important that they are applied at the time of year and dosage that will most affect the milfoil, with the least effect on other native plants.

- The chemical treatment of invasive milfoil is just one part of the effort to protect native aquatic plants on the Minong Flowage and other area lakes. The Minong Flowage Association's work also includes a watercraft inspection program at the landings to assure proper boat cleaning practices are followed. Detailed plant surveys of the native plant beds and species are also included in their aquatic plant management efforts.

Based on our discussion as part of Voigt Task Force consultation, we are requiring these additional measures in the permit:

1. Smaller treatment area: Dave Blumer, (consultant for the Minong Flowage Association) has submitted a revised plan that reduces the area treated in the south end of Serenity Bay, using a similar approach as was permitted in 2010. We accept this proposal for a smaller, targeted treatment area as a way to apply the chemical further downstream of the rice and reduce the risk of herbicide drift to the wild rice beds.

2. Advance notification: The permit will require posting at the landings one day prior to treatment. We will require that Great Lakes Indian Fish and Wildlife Commission (GLIFWC) and St. Croix Tribal Natural Resources Department (hereafter "St. Croix') staff be notified by electronic mail at the time of posting as well.

3. Herbicide residual testing: The project plan requires monitoring of the amount of chemical residual in the water at various locations and time intervals during and after treatment. This monitoring is also a condition of the permit. We will require that the results of this testing for chemical persistence be provided to GLIFWC and St. Croix staff upon request after the completion of the project. This will give all of us better information on how long the chemical remains in the water after treatment and potential exposure to native plants including the rice.

4. Plant surveys to determine effectiveness: The permit requires plant surveys before and after treatment. We will require that the growth stage and perimeter of the upstream rice bed be mapped before and after treatment as well. The edge of the rice bed must also be checked for any significant loss of rice or noticeable effect on rice plants (recognizing that other factors like boat wakes, water level fluctuations, and insects can also impact rice).

5. Future plan update: As mentioned earlier, the Minong Flowage Aquatic Plant Management Plan must be reviewed and updated before further plant control permits are issued. St. Croix and GLIFWC representatives will be invited to participate in this process.

We also support these further ideas that have been proposed to augment the project:

- Dye-tracer study of the flow patterns in Serenity Bay may be done this summer to give better information on flow into and out of the rice beds and milfoil-infested areas.

- The Minong Flowage Association, through their consultant Dave Blumer, has offered to host a float tour of the Flowage for any interested Task Force or Tribal Members.

- The Department is willing to organizing meetings this winter for technical staff from the tribes and GLIFWC, key lake associations or consultants, and experts from other agencies. The goal of the meetings is to discuss concerns, scientific study findings, and further research needed to help us define the best practices in managing invasive aquatic species, protecting wild rice and other native plants, and maintaining healthy aquatic ecosystems.

We sincerely thank you for the time and consideration given to this consultation process by the Task Force members, Lisa David and Peter David and other GLIFWC staff. We especially want to thank Carmen Butler and the elders and staff of the St. Croix Tribe for graciously hosting an additional meeting, and their careful and thoughtful deliberation on this issue. We look forward to working together on this and other resource projects.

Sincerely,

John Gozdzialski
Northern Region Director

Cc: Lisa David, Manoomin Biologist, GLIFWC
Peter David, Wildlife Biologist, GLIFWC
Tom Maulson, Chairman, Voigt Intertribal Task Force
Aaron Loomis, Tribal Attorney, St. Croix Chippewa Indians of Wisconsin
Carmen Butler, Voigt Intertribal Task Force Representative
Conrad St. John, Voigt Intertribal Task Force Representative
Junior Mosay, Voigt Intertribal Task Force Representative
Lewis Taylor, Tribal Chair, St. Croix Chippewa Indians of Wisconsin
Katie Stariha, Environmental Department Director, St. Croix Chippewa Indians of Wisconsin
Tony Havranek, Water Resources Manager, St. Croix Chippewa Indians of Wisconsin

Appendix E

St. Croix POCIS Pesticide Write-up

An active cranberry bog is located on the St. Croix River near Gordon, WI. The bog uses water from the St. Croix River for crop irrigation and for flooding during harvest, and discharges water (runoff from precipitation and irrigation or groundwater discharge) to the river. Stakeholders have been concerned about pesticide contamination from the cranberry bog which has led to small scale investigations of its impact on the St. Croix River by the CWSE. Sediment samples were collected near the cranberry bog in June 2006 and May 2007 (Figure 1) and analyzed for both currently and historically used agricultural pesticides, including DDT and its degradates. None of the sediment samples were found to have pesticide concentrations above the limits of detection (LOD). In April 2007, semipermeable membrane device (SPMD) passive samplers were deployed near the cranberry bog. The SPMDs also had no concentrations of pesticides above the LOD.

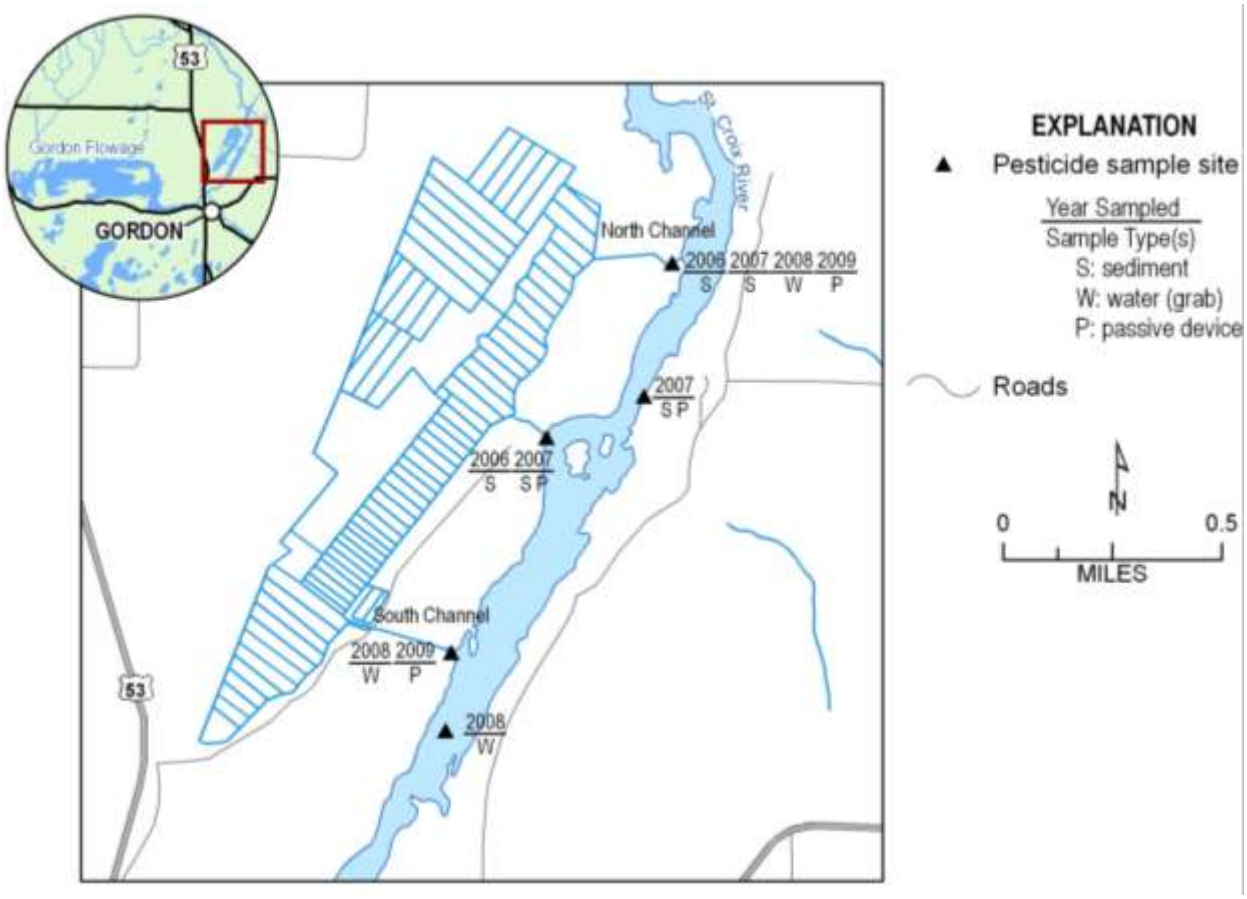


Figure 1. Location of pesticide samples collected near the cranberry bog in Gordon, WI by the CWSE from 2006 through 2009.

During the summer of 2008, the northern and southern channels of the cranberry bog were identified as the primary water discharge channels and the central channel identified as the primary inflow (irrigation) channel of the bog. Grab samples were taken on 18 and 19-June-2008 after it was discovered that a pesticide application had occurred on 17-June-2008. Grab samples taken near the

northern and southern channels were found to have detectable concentrations of the pesticide diazinon (Table 1). Pesticides were not detected in follow-up samples taken on 30-July-2008.

Table 1. Concentrations of the pesticide diazinon detected in the St. Croix River near the cranberry bog in Gordon, WI in 2008.

Sample Site	Sample Date	Diazinon (µg/L)
Northern Channel	6/18/2008	0.76
Southern Channel	6/18/2008	*0.27*
Northern Channel	6/19/2008	*0.33*
Southern Channel	6/19/2008	0.81
Northern Channel	7/30/2008	<LOD
Southern Channel	7/30/2008	<LOD
250 yds Downstream of S. Channel	7/30/2008	<LOD

Italicized values are above limit of detection (LOD) but below limit of quantitation (LOQ).
<LOD, less than limit of detection.

Polar Organic Chemical Integrative Sampler (POCIS) devices were deployed to monitor pesticide concentrations in the St. Croix River near the cranberry bog during the 2009 field season (Figure 2). POCIS devices were selected because they can accumulate water soluble compounds in low concentrations, provide qualitative and quantitative measurements of compounds, and are more logistically sound than grab samples. POCIS devices can remain in-stream for extended periods of time, generally one month, which provides time-weighted average concentrations of compounds. This extended sampling period also captures low concentrations and episodic events that could otherwise be missed in grab samples and can provide an exposure assessment of aquatic organisms.

Figure 2. POCIS devices (discs with white centers) shown mounted in a deployment canister. Note: In the figure, three POCIS are mounted, whereas this study deployed one POCIS per canister. (Source: www.est-lab.com/pocis.php)

A POCIS canister, containing one POCIS device, was installed near both the northern and southern channels of the cranberry bog. The devices were deployed from May through September 2009 for five consecutive periods that ranged from 20 to 39 days in length. Upon collection, the POCIS devices were immediately bagged and transported on ice to the UWSP Water and Environmental Analysis Lab (WEAL) Organics Laboratory for analysis.

If the sampling rate (the rate in which a compound can be taken up) of a particular compound is known, the time-weighted average concentration measured by the POCIS device can be converted to an estimate of the ambient water concentration. Sampling rates are empirically determined and are a function of water temperature, water velocity, surface area of the sampling device, and the amount of sediment accumulation on the device (Alvarez et al., 2008). Estimates of average ambient water concentration are found by dividing the POCIS concentration by the volume of water sampled, where the volume of water sampled is the product of the sampling rate and the number of days the POCIS was deployed. Preliminary sampling rates of detected pesticides under turbulent conditions at 20C were obtained for the detected pesticides (D. Alvarez, personal communication, 2010). These sampling rate data are appropriate for this study; water temperature ranged from 13C to 23C and was generally below 20C, and although the water at the sampling sites was generally quiescent, some flow was often visible in the channel.

The estimated volume of water sampled can used to adjust the limits of detection (LOD) and limits of quantitation (LOQ). The LOD and LOD for a constituent are provided by the WEAL in terms of concentration detectable or quantifiable for a 1 L water sample. Dividing the LOD and LOQ by the sample volume provides an adjusted value. The volume of water sampled for diazinon and chlorpyrifos ranged from 8.5 to 16.5 L and for malathion from 1 to 2 L. All reported values are above the adjusted LOD; however, due to the preliminary nature of the constituent sampling rates and the theoretical adjusted LOD concentrations, the POCIS concentrations and the estimates of ambient water concentration above established LOD are provided for qualitative and informational purposes only and should not be considered definitive values.

The pesticides detected in the St. Croix River were diazinon, chlorpyrifos, and malathion (Table 2). Diazinon, chlorpyrifos, and malathion are organophosphorus pesticides, which are commonly used in agriculture and are known to be toxic to amphibians. Concentrations from 2008 and estimated ambient water concentrations from 2009 were below toxic levels; however, the interaction of exposure to more than one of these compounds or exposure coupled with other environmental factors is

unknown. A study performed by Sparling and Fellers (2007) determined that the oxons (formed when oxygen replaces sulfur in a phosphorus-sulfur bond) derived from the three pesticides detected are 10- to 100-times more toxic than the parent compounds.

Table 2. Pesticide concentrations in POCIS devices and estimated average ambient water concentrations in the St. Croix River near the cranberry bog in Gordon, WI. Note: values are appropriate for adjusted limits of detection (LOD), but have been identified if values fell below established LOD for grab samples due to the preliminary nature of the constituent sampling rates. These estimates are provided for qualitative and informational purposes only and should not be considered definitive values.
[L, liter; µg, microgram; ng, nanogram]

Site Location	Collection Date	Days Deployed	Diazinon		Chlorpyrifos		Malathion	
			µg/POCIS	ng/L water	µg/POCIS	ng/L water	µg/POCIS	ng/L water
Northern	6/26/2009	39	15	0.9	44	2.7	<LOD	ND
	7/27/2009	31	**D**	ND	<LOD	ND	<LOD	ND
	8/25/2009	29	380	30.9	<LOD	ND	<LOD	ND
	9/27/2009	33	**D**	ND	<LOD	ND	<LOD	ND
	10/17/2009	20	<LOD	ND	<LOD	ND	<LOD	ND
Southern	6/26/2009	28	<LOD	ND	29	2.4	<LOD	ND
	7/27/2009	31	20	1.5	<LOD	ND	<LOD	ND
	8/25/2009	29	6	0.5	<LOD	ND	360	243.4
	9/27/2009	33	**D**	ND	<LOD	ND	130	77.2
	10/17/2009	20	<LOD	ND	<LOD	ND	<LOD	ND

"<LOD" indicates sample was below limits of detection (LOD) for established grab sample analyses.

"ND" indicates POCIS sample was <LOD.

Underlined values were detected concentration, but below LOD for grab sample analyses.

"**D**" indicates compound was detected, but well below LOD and therefore not assigned a value.

Diazinon and chlorpyrifos were present at both sites some time during the year and malathion was detected near the southern channel of the bog in August and September. No pesticides were detected from 27-September through 17-October when sampling ended. It is interesting to note that from June through July, the diazinon concentration increased near the southern bog channel and decreased near the northern channel. Knowledge of the hydraulics of the cranberry bog (i.e., the movement of water throughout the bog) and of pesticide application times and locations are required to perform a full qualitative evaluation of the data.

References:

Sparling, D.W., and G. Fellers. 2007. Comparative toxicity of chlorpyrifos, diazinon, malathion and their oxon derivatives to larval Rana boylii. Environmental Pollution 147:535–539.

Alvarez, D.A., W.L Cranor, S.D. Perkins, R.C. Clark, and S.B. Smith, 2008. Chemical and toxicologic assessment of organic contaminants in surface water using passive samplers. Journal of Environmental Quality 37:1024-1033. doi: 10.2134/jeq2006.0463.

Appendix F

NR 107

Chapter NR 107

AQUATIC PLANT MANAGEMENT

Note: Chapter NR 107 as it existed on February 28, 1989 was repealed and a new Chapter NR 107 was created effective March 1, 1989.

NR 107.01 Purpose. The purpose of this chapter is to establish procedures for the management of aquatic plants and control of other aquatic organisms pursuant to s. 227.11 (2) (a), Stats., and interpreting s. 281.17 (2), Stats. A balanced aquatic plant community is recognized to be a vital and necessary component of a healthy aquatic ecosystem. The department may allow the management of nuisance−causing aquatic plants with chemicals registered and labeled by the U.S. environmental protection agency and labeled and registered by firms licensed as pesticide manufacturers and labelers with the Wisconsin department of agriculture, trade and consumer protection. Chemical management shall be allowed in a manner consistent with sound ecosystem management and shall minimize the loss of ecological values in the water body.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; **correction made under s. 13.93 (2m) (b) 7., Stats., Register, December, 2000, No. 540.**

NR 107.02 Applicability. Any person sponsoring or conducting chemical treatment for the management of aquatic plants or control of other aquatic organisms in waters of the state shall obtain a permit from the department. Waters of the state include those portions of Lake Michigan and Lake Superior, and all lakes, bays, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, watercourses, drainage systems and other ground or surface water, natural or artificial, public or private, within the state or its jurisdiction as specified in s. 281.01 (18), Stats.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; **correction made under s. 13.93 (2m) (b) 7., Stats., Register, December, 2000, No. 540.**

NR 107.03 Definitions. (1) "Applicator" means the person physically applying the chemicals to the treatment site.

(2) "Chemical fact sheet" means a summary of information on a specific chemical written by the department including general aquatic community and human safety considerations applicable to Wisconsin sites.

(3) "Department" means the department of natural resources.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.04 Application for permit. (1) Permit applications shall be made on forms provided by the department and shall be submitted to the district director for the district in which the project is located. Any amendment or revision to an application shall be treated by the department as a new application, except as provided in s. NR 107.04 (3) (g).

Note: The DNR district headquarters are located at:
1. Southern — 3911 Fish Hatchery Road, Fitchburg 53711
2. Southeast — 2300 N. Dr. Martin Luther King Jr. Dr., Box 12436, Milwaukee 53212
3. Lake Michigan — 1125 N. Military Ave., Box 10448, Green Bay 54307
4. North Central — 107 Sutliff Ave., Box 818, Rhinelander 54501
5. Western — 1300 W. Clairemont Ave., Call Box 4001, Eau Claire 54702
6. Northwest — Hwy 70 West, Box 309, Spooner 54801

(2) The application shall be accompanied by:

(a) A nonrefundable permit application fee of $20, and, for proposed treatments larger than 0.25 acres, an additional refundable acreage fee of $25.00 per acre, rounded up to the nearest whole acre, applied to a maximum of 50.0 acres.

1. The acreage fee shall be refunded in whole if the entire permit is denied or if no treatment occurs on any part of the permitted treatment area. Refunds will not be prorated for partial treatments.

2. If the permit is issued with the proposed treatment area partially denied, a refund of acreage fees shall be given for the area denied.

(b) A legal description of the body of water proposed for treatment including township, range and section number;

(c) One copy of a detailed map or sketch of the body of water with the proposed treatment area dimensions clearly shown and with pertinent information necessary to locate those properties, by name of owner, riparian to the treatment area, which may include street address, local telephone number, block, lot and fire number where available. If a local address is not available, the home address and phone number of the property owner may be included;

(d) A description of the uses being impaired by plants or aquatic organisms and reason for treatment;

(e) A description of the plant community or other aquatic organisms causing the use impairment;

(f) The product names of chemicals proposed for use and the method of application;

(g) The name of the person or commercial applicator, and applicator certification number, when required by s. NR 107.08 (5), of the person conducting the treatment;

(h) A comparison of alternative control methods and their feasibility for use on the proposed treatment site.

(3) In addition to the information required under sub. (2), when the proposed treatment is a large−scale treatment exceeding 10.0 acres in size or 10% of the area of the water body that is 10 feet or less in depth, the application shall be accompanied by:

(a) A map showing the size and boundaries of the water body and its watershed.

(b) A map and list identifying known or suspected land use practices contributing to plant−related water quality problems in the watershed.

(c) A summary of conditions contributing to undesirable plant growth on the water body.

(d) A general description of the fish and wildlife uses occurring within the proposed treatment site.

(e) A summary of recreational uses of the proposed treatment site.

(f) Evidence that a public notice of the proposed application has been made, and that a public informational meeting, if required, has been conducted.

1. Notice shall be given in 2 inch x 4 inch advertising format in the newspaper which has the largest circulation in the area affected by the application.

2. The notice shall state the size of the proposed treatment, the approximate treatment dates, and that the public may request within 5 days of the notice that the applicant hold a public informational meeting on the proposed application.

a. The applicant will conduct a public informational meeting in a location near the water body when a combination of 5 or more individuals, organizations, special units of government, or local units of government request the meeting in writing to the applicant

with a copy to the department within 5 days after the notice is made. The person or entity requesting the meeting shall state a specific agenda of topics including problems and alternatives to be discussed.

b. The meeting shall be given a minimum of one week advance notice, both in writing to the requestors, and advertised in the format of subd. 1.

(g) The provisions of pars. (a) to (e) shall be repeated once every 5 years and shall include new information. Annual modifications of the proposed treatment within the 5−year period which do not expand the treatment area more than 10% and cover a similar location and target organisms may be accepted as an amendment to the original application. The acreage fee submitted under sub. (2) (a) shall be adjusted in accordance with any proposed amendments.

(4) The applicant shall certify to the department that a copy of the application has been provided to any affected property owners' association, inland lake district, and, in the case of chemical applications for rooted aquatic plants, to any riparian property owners adjacent to and within the treatment area.

(5) A notice of the proposed treatment shall be provided by the department to any person or organization indicating annually in writing a desire to receive such notification.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.05 Issuance of permit. (1) The department shall issue or deny issuance of the requested permit between 10 and 15 working days after receipt of an acceptable application, unless:

(a) An environmental impact report or statement is required under s. 1.11, Stats. Notification to the applicant shall be in writing within 10 working days of receipt of the application and no action may be taken until the report or statement has been completed; or

(b) A public hearing has been granted under s. 227.42, Stats.

(2) If a request for a public hearing is received after the permit is issued but prior to the actual treatment allowed by the permit, the department is not required to, but may, suspend the permit because of the request for public hearing.

(3) The department may deny issuance of the requested permit if:

(a) The proposed chemical is not labeled and registered for the intended use by the United States environmental protection agency and both labeled and registered by a firm licensed as a pesticide manufacturer and labeler with the Wisconsin department of agriculture, trade and consumer protection;

(b) The proposed chemical does not have a current department aquatic chemical fact sheet;

(c) The department determines the proposed treatment will not provide nuisance relief, or will place unreasonable restrictions on existing water uses;

(d) The department determines the proposed treatment will result in a hazard to humans, animals or other nontarget organisms;

(e) The department determines the proposed treatment will result in a significant adverse effect on the body of water;

(f) The proposed chemical application is for waters beyond 150 feet from shore except where approval is given by the department to maintain navigation channels, piers or other facilities used by organizations or the public including commercial facilities;

(g) The proposed chemical applications, other than those conducted by the department pursuant to ss. 29.421 and 29.424, Stats., will significantly injure fish, fish eggs, fish larvae, essential fish food organisms or wildlife, either directly or through habitat destruction;

(h) The proposed chemical application is in a location known to have endangered or threatened species as specified pursuant to s. 29.604, Stats., and as determined by the department;

(i) The proposed chemical application is in locations identified by the department as sensitive areas, except when the applicant demonstrates to the satisfaction of the department that treatments can be conducted in a manner that will not alter the ecological character or reduce the ecological value of the area.

1. Sensitive areas are areas of aquatic vegetation identified by the department as offering critical or unique fish and wildlife habitat, including seasonal or lifestage requirements, or offering water quality or erosion control benefits to the body of water.

2. The department shall notify any affected property owners' association, inland lake district, and riparian property owner of locations identified as sensitive areas.

(4) New applications will be reviewed with consideration given to the cumulative effect of applications already approved for the body of water.

(5) The department may approve the application in whole or in part consistent with the provisions of subs. (3) (a) through (i) and (4). Denials shall be in writing stating reasons for the denial.

(6) Permits may be issued for one treatment season only.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; **corrections in (3) (g) and (h) made under s. 13.93 (2m) (b) 7., Stats., Register, December, 2000, No. 540.**

NR 107.06 Chemical fact sheets. (1) The department shall develop a chemical fact sheet for each of the chemicals in present use for aquatic nuisance control in Wisconsin.

(1m) Chemical fact sheets for chemicals not previously used in Wisconsin shall be developed within 180 days after the department has received notice of intended use of the chemical.

(2) The applicant or permit holder shall provide copies of the applicable chemical fact sheets to any affected property owners' association and inland lake district.

(3) The department shall make chemical fact sheets available upon request.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.07 Supervision. (1) The permit holder shall notify the district office 4 working days in advance of each anticipated treatment with the date, time, location, and proposed size of treatment. At the discretion of the department, the advance notification requirement may be waived.

(2) Supervision by a department representative may be required for any aquatic nuisance control project involving chemicals. Supervision may include inspection of the proposed treatment area, chemicals, and application equipment before, during or after treatment. The inspection may result in the determination that treatment is unnecessary or unwarranted in all or part of the proposed area, or that the equipment will not control the proper dosage.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.08 Conditions of the permit. (1) The department may stop or limit the application of chemicals to a body of water if at any time it determines that chemical treatment will be ineffective, or will result in unreasonable restrictions on current water uses, or will produce unnecessary adverse side effects on nontarget organisms. Upon request, the department shall state the reason for such action in writing to the applicant.

(2) Chemical treatments shall be performed in accordance with label directions, existing pesticide use laws, and permit conditions.

(3) Chemical applications on lakes and impoundments are limited to waters along developed shoreline including public parks except where approval is given by the department for projects of public benefit.

(4) Treatment of areas containing high value species of aquatic plants shall be done in a manner which will not result in adverse long−term or permanent changes to a plant community in a specific aquatic ecosystem. High value species are individual species of aquatic plants known to offer important values in spe-

cific aquatic ecosystems, including *Potamogeton amplifolius, Potamogeton Richardsonii, Potamogeton praelongus, Potamogeton pectinatus, Potamogeton illinoensis, Potamogeton robbinsii, Eleocharis spp., Scirpus spp., Valisneria spp., Zizania aquatica, Zannichellia palustris* and *Brasenia schreberi.*

(5) Treatment shall be performed by an applicator currently certified by the Wisconsin department of agriculture, trade and consumer protection in the aquatic nuisance control category whenever:

(a) Treatment is to be performed for compensation by an applicator acting as an independent contractor for hire;

(b) The area to be treated is greater than 0.25 acres;

(c) The product to be used is classified as a "restricted use pesticide"; or

(d) Liquid chemicals are to be used.

(6) Power equipment used to apply liquid chemicals shall include the following:

(a) Containers used to mix and hold chemicals shall be constructed of watertight materials and be of sufficient size and strength to safely contain the chemical. Measuring containers and scales for the purpose of measuring solids and liquids shall be provided by the applicator;

(b) Suction hose used to deliver the chemical to the pump venturi assembly shall be fitted with an on−off ball−type valve. The system shall also be designed to prevent clogging from chemicals and aquatic vegetation;

(c) Suction hose used to deliver surface water to the pump shall be fitted with a check valve to prevent back siphoning into the surface water should the pump stop;

(d) Suction hose used to deliver a premixed solution shall be fitted with an on−off ball−type valve to regulate the discharge rate;

(e) Pressure hose used to discharge chemicals to the surface water shall be provided with an on−off ball−type valve. This valve will be fitted at the base of the hose nozzle or as part of the nozzle assembly;

(f) All pressure and suction hoses and mechanical fittings shall be watertight;

(g) Equipment shall be calibrated by the applicator. Evidence of calibration shall be provided at the request of the department supervisor.

(h) Other equipment designs may be acceptable if capable of equivalent performance.

(7) The permit holder shall be responsible for posting those areas of use in accordance with water use restrictions stated on the chemical label, but in all cases for a minimum of one day, and with the following conditions:

(a) Posting signs shall be brilliant yellow and conspicuous to the nonriparian public intending to use the treated water from both the water and shore, and shall state applicable label water use restrictions of the chemical being used, the name of the chemical and date of treatment. For tank mixes, the label requirements of the most restrictive chemical will be posted;

(b) Minimum sign dimensions used for posting shall be 11 inches by 11 inches or consistent with s. ATCP 29.15. The department will provide up to 6 signs to meet posting requirements. Additional signs may be purchased from the department;

(c) Signs shall be posted at the beginning of each treatment by the permit holder or representing agent. Posting prior to treatment may be required as a permit condition when the department determines that such posting is in the best interest of the public;

(d) Posting signs shall be placed along contiguous treated shoreline and at strategic locations to adequately inform the public. Posting of untreated shoreline located adjacent to treated shoreline and noncontiguous shoreline shall be at the discretion of the department;

(e) Posting signs shall be made of durable material to remain up and legible for the time period stated on the pesticide label for water use restrictions, after which the permit holder or representing agent is responsible for sign removal.

(8) After conducting a treatment, the permit holder shall complete and submit within 30 days an aquatic nuisance control report on a form supplied by the department. Required information will include the quantity and type of chemical, and the specific size and location of each treatment area. In the event of any unusual circumstances associated with a treatment, or at the request of the department, the report shall be provided immediately. If treatment did not occur, the form shall be submitted with appropriate comment by October 1.

(9) Failure to comply with the conditions of the permit may result in cancellation of the permit and loss of permit privileges for the subsequent treatment season. A notice of cancellation or loss of permit privileges shall be provided by the department to the permit holder accompanied by a statement of appeal rights.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89**;** correction in (7) (b) made under s. 13.93 (2m) (b) 7., Stats., Register, September, 1995, No. 477.

NR 107.09 Special limitation. Due to the significant risk of environmental damage from copper accumulation in sediments, swimmer's itch treatments performed with copper sulfate products at a rate greater than 10 pounds of copper sulfate per acre are prohibited.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.10 Field evaluation use permits. When a chemical product is considered for aquatic nuisance control and does not have a federal label for such use, the applicant shall apply to the administrator of the United States environmental protection agency for an experimental use permit under section 5 of the federal insecticide, fungicide and rodenticide act as amended (7 USC 136 et seq.). Upon receiving a permit, the permit holder shall obtain a field evaluation use permit from the department and be subject to the requirements of this chapter. Department field evaluation use permits shall be issued for the purpose of evaluating product effectiveness and safety under field conditions and will require in addition to the conditions of the permit specified in s. NR 107.08 (1) through (9), the following:

(1) Treatment shall be limited to an area specified by the department.

(2) The permit holder shall submit to the department a summary of treatment results at the end of the treatment season. The summary shall include:

(a) Total chemical used and distribution pattern, including chemical trade name, formulation, percent active ingredient, and dosage rate in the treated water in parts per million of active ingredient;

(b) Description of treatment areas including the character and the extent of the nuisance present;

(c) Effectiveness of the application and when applicable, a summary comparison of the results obtained from past experiments using the same chemical formulation;

(d) Other pertinent information required by the department; and

(e) Conclusions and recommendations for future use.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 107.11 Exemptions. (1) Under any of the following conditions, the permit application fee in s. NR 107.04 (2) (a) will be limited to the basic application fee:

(a) The treatment is made for the control of bacteria on swimming beaches with chlorine or chlorinated lime;

(b) The treatment is intended to control algae or other aquatic nuisances that interfere with the use of the water for potable purposes;

(c) The treatment is necessary for the protection of public health, such as the control of disease carrying organisms in sanitary sewers, storm sewers, or marshes, and the treatment is sponsored by a governmental agency.

(2) The treatment of purple loosestrife is exempt from ss. NR 107.04 (2) (a) and (3), and 107.08 (5).

(3) The use of chemicals in private ponds is exempt from the provisions of this chapter except for ss. NR 107.04 (1), (2), (4) and (5), 107.05, 107.07, 107.08 (1), (2), (8) and (9), and 107.10.

(a) A private pond is a body of water located entirely on the land of an applicant, with no surface water discharge or a discharge that can be controlled to prevent chemical loss, and without access by the public.

(b) The permit application fee will be limited to the non−refundable $20 application fee.

(4) The use of chemicals in accordance with label instructions is exempt from the provisions of this chapter, when used in:

(a) Water tanks used for potable water supplies;

(b) Swimming pools;

(c) Treatment of public or private wells;

(d) Private fish hatcheries licensed under s. 95.60, Stats.;

(e) Treatment of emergent vegetation in drainage ditches or rights−of−way where the department determines that fish and wildlife resources are insignificant; or

(f) Waste treatment facilities which have received s. 281.41, Stats., plan approval or are utilized to meet effluent limitations set forth in permits issued under s. 283.31, Stats.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; **corrections in (4) (d) and (f) made under s. 13.93 (2m) (b) 7., Stats., Register, December, 2000, No. 540.**

Appendix G

Pre-Post Aquatic Plant Treatment Evaluation Protocol

Aquatic Plant Treatment Evaluation

Purpose and Applicability

This protocol is used to evaluate the results of herbicide application or any other manipulation (but from here on called a chemical application or treatment) to reduce aquatic invasive plant species. The following protocol is applicable for introducing new treatments to lakes where the treatment size is greater than 10 acres or greater than 10% of the lake littoral area and more than 150 feet from shore*. It is designed to satisfy AIS grant-funded treatment conditions where restoration is a goal or where performance results are needed (i.e. for scientific or financial accountability). This protocol is written for Eurasian water-milfoil (EWM) but can be adapted for Curly-leaf pondweed and other aquatic invasive plants. This protocol may be adapted to evaluate non-herbicide controls.

This protocol assumes that the lake group has an Aquatic Plant Management (APM) Plan in place with specific goals for the native and invasive species in the lake. For example, the group should choose a percent decrease in the target plant area coverage or frequency of occurrence for an annual goal of at least 50% for restoration projects. For an overall long term goal, a reduction to less than large scale treatment (less than 10 acres or 10% of lake littoral area) where annual spot treatments can sustain low level occurrences is reasonable. Additionally, a goal of reducing the density of EWM beds by one category (for example, from high density to medium density, or from an average rake fullness of 2.5 to 1.5) might be appropriate. An acceptable native response is no significant net loss over the course of the project, and ideally some gain.

We are aware that this approach necessitates several visits to the lake per year. This work is necessary to assess the overall success of chemical treatments at reducing invasive species and at enhancing native species. After we learn how each lake responds to the treatment, we hope and expect that we will be able to cut back on the annual evaluations. For now, we need rigorous data collection that will help deal with invasive aquatic plants.

Reporting requirements are provided at the end of each step in the protocol. These are provided as a basis for improving consistency in analysis and reporting and can be used to interpret and discuss pre- and post-treatment results and in making next season's management recommendations. Please refer to this description as a guide on how to fulfill the requirements of the grant.

***Note that whole-lake scale treatment projects (those involving ≥160 acres or ≥50% of the lake littoral area) may follow a slightly different protocol, as described in the text. For newly discovered or pioneer populations of EWM (defined as a localized bed that has been present less than 5 years and is less than 5 acres in size or less than 5% of lake area whichever is greater), consult *Response for Early Detection of Eurasian Water Milfoil Field Protocol* available from the WDNR web site.**

Section I. Protocol

Year 1 Season before treatment

1. *Establish baseline information about plant community*.
    a. In the season prior to a chemical treatment, perform a whole-lake summer point/intercept (P/I) survey to characterize the entire plant community if it has not been done within 5 years.
    b. Details on the protocol for conducting plant surveys can be found in *Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: Sampling Design, Field and Laboratory Procedures, Data Entry and Analysis, and Applications*.
    c. Report Requirements: Baseline Lake Point Intercept Survey
        i. Table: Frequency of Occurrence for all species (this is calculated automatically in the "Stats" worksheet of the Aquatic Plant Survey Data Workbook.
        ii. Table: Species list
        iii. Map: Rake fullness (1, 2, 3) for all aquatic invasive plants (see example, Figure 1.)
        iv. Maps: In order to assess species interactions and chemical impacts on non-target plants, map other plants as appropriate (such as wild rice, other common plants, other common dicots, species of concern, other water-milfoils – consult APM plan or local DNR lake manager) similar to Figure 1. You may need a separate map for each species or group of species.

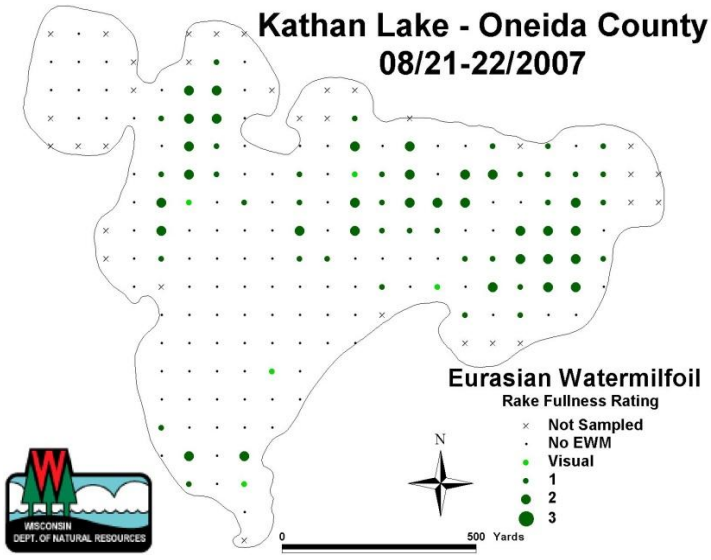


Figure 1.

2. *Identify and map plant beds proposed for treatment*
    a. During the summer or early fall growing season prior to the chemical treatment, map the proposed treatment areas of EWM and identify these polygons using GPS

to outline the beds. As explained below (Year 1 Season before treatment 4.), all species within the proposed treatment polygons must be assessed, and native should be assessed before Sept 1 in northern WI and late September in the south.

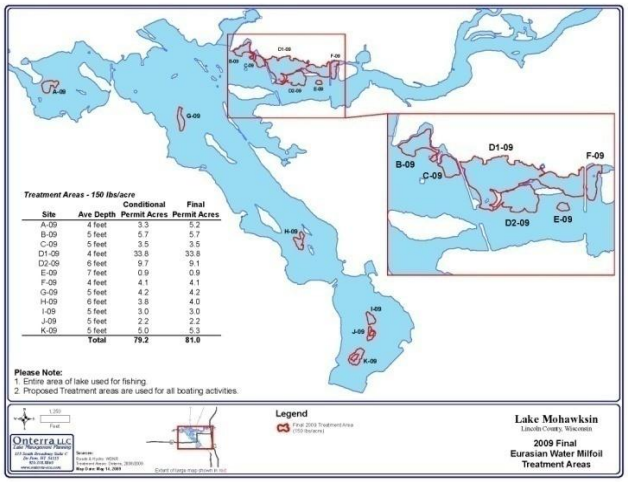
i. The initial P/I survey is unlikely to identify every stand of EWM. Map the invasive beds using a number of strategies such as:
    1. Use a meander search (boat out from shore to the maximum rooting zone and then head back to shore, a short ways down the shore from where you started) to find beds.
    2. If clarity is good (to the depth of rooted plants) and the EWM bed is topped out, identification can be visual but must be augmented with rake tosses to verify species identification and find the edges of the bed. Under glare conditions, brown polarized sunglasses are helpful.
    3. If visibility is limited, SCUBA, underwater video and an Aqua-View Scope are all highly recommended to make a complete assessment of the beds.
    4. Look for plant fragments wind-rowed on shore as an indication that plants may be growing off shore from this point.

ii. Note that in order to secure a chemical treatment permit, the applicant must know the acreage and location of the treatment areas.

b. Report Requirements: Polygons of EWM for treatment

i. Maps: Map beds of EWM treatment areas
    1. Identify beds using numbers or letters (see example, Figure 2.)

Figure 2.



ii. Table: Report information about polygons to be treated, including acreage, depth, substrate, number of sampling points and treatment dose and density* (see example, Table 1.).
    1. *Density: To characterize density of individual polygons and help guide treatment decisions, estimate the coverage of EWM within individual polygons. Use this qualitative metric in conjunction with the quantitative metric of rake fullness. Examples of categories could

be low, medium, high or single plants, clumps, scattered, dominant, highly dominant, surface matting).

Table 1. Polygon Treatment Data (example data)

EWM Beds	Acreage	Mean depth	Substrate	PI points	Treatment rate (lbs/acre)	Density
a	1.2	4	Sand	5	100	low
b	0.8	8	Muck	5	150	medium
c	5.6	5	sand/muck	25	100	medium
d	12.3	6	Muck	50	150	high
e	2.4	7	Muck	15	150	low

3. *Confirm EWM identification.*
    a. Collect one EWM plant from each large (> 5 acres) treatment polygon where these exist, but collect at least 3 plants per lake.
    b. These EWM plants may be collected in the summer/fall before the treatment year or spring just before treatment, but the identification must be confirmed by the DNR or appropriate university personnel before treatment takes place. The DNR may ask to see a specimen from either the fall or the spring survey.
    c. Report Requirement:
        i. Document EWM identification by the DNR or appropriate university personnel.
4. *Conduct PI Survey in Proposed Treatment Polygons*.
    a. In order to assess the effect of chemical treatment on natives, there must be a survey of <u>all</u> plant species in the treatment polygons before treatment. However, since natives will be largely absent at the time of the spring pre-treatment survey, the natives must be assessed the summer before treatment (before September 1 in northern WI and by mid-late September in the south). Therefore, after defining the proposed treatment polygons (2a above), perform a presence/absence, rake fullness, and depth assessment of all plants at a sub-sample of points within and near the polygons as follows (Table 2.):
        i. Sample at least 100 points per lake among the beds
        ii. Sample a minimum of 4 points (to ensure enough detail of the plant beds) but a maximum of 10 points (the maximum resolution of many GPS units) per treated acre.
        iii. The points needn't be spread evenly across all treatment polygons, but it will be most informative to distribute the points among the largest polygons.
        iv. Record the point locations as they will be used again the following year. (It is not necessary to report these locations, but they will be needed for report maps eventually)
        v. By sampling 100 points for the pre- and post-treatment survey, you will be able to detect a 20% or larger change in species frequency (of both natives and the target species).
            1. You would have to sample many more points (approximately 350 points) to see a 10% change in a species frequency.

Table 2. Number of points to sample in proposed treatment polygons (polygon subsample points), based on total acreage of treatments to be evaluated.

Area to be treated (acres)	# of Points to sample
10	100
20	100
30	120
40	160
50	200
100	400

b. If the proposed treatment area consists of more than 50% of the lake littoral area, or whole-lake scale treatment methods are being used (i.e. liquid applications), then this step (identification of and sampling polygons) is omitted.
    i. Instead, whole-lake P/I surveys should be conducted each year following treatment for the purposes of post-treatment evaluation.
    ii. More intensive monitoring in some polygons may be warranted for evaluating treatment effectiveness or fine-tuning treatment regimes.

c. Report Requirements:
    i. Map: Map polygons to be treated and locations of all the points to be sampled within the polygon (polygon subsample points) (see examples Figures 3. and 4.).
    ii. Map: Rake fullness (1,2,3) for all aquatic invasive plants within polygon subsample points. This map will look like Figure 1, but for each polygon.
    iii. Map: In order to assess species interactions and chemical impacts on non-target plants map other plants in polygon subsamples as appropriate (such as wild rice, other common plants, other common dicots, species of concern, other water-milfoils). This map will look like Figure 1, but for each polygon. Consult DNR lake manager or APM plan.
    iv. Table: Frequency of occurrence for all species for all polygon subsample points (use the "Stats" worksheet of the Aquatic Plant Survey Data Workbook).
    v. These report requirements should be coupled with post-treatment results and available after evaluation.

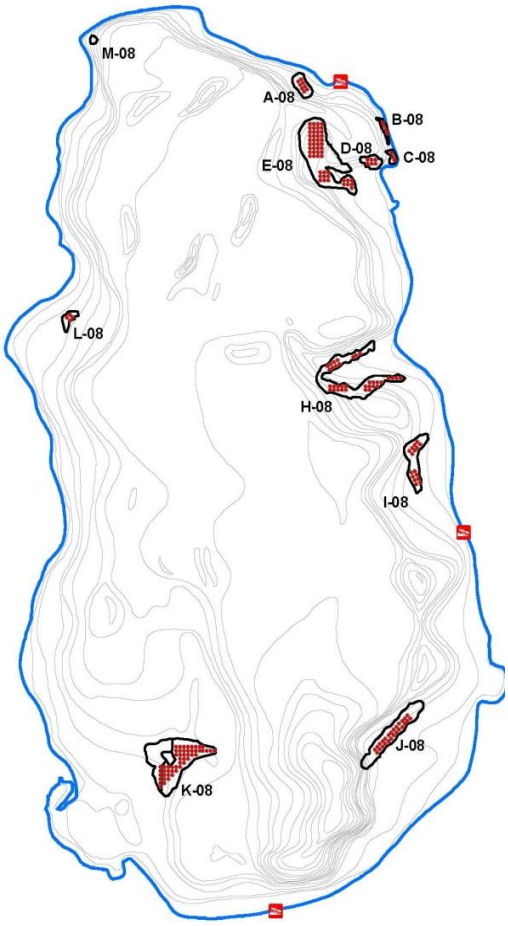


Figure 3.

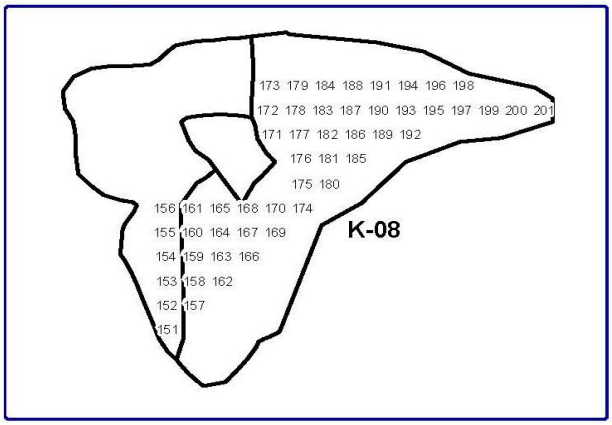


Figure 4.

Year 2 First treatment

1. *Pre-treatment Survey - Spring just before treatment*
    a. Verify EWM is growing and finalize treatment areas. Plants may be small, and may be sparse this time of year. Underwater visual/video of the middle and edges of the proposed polygon is highly recommended. Adjust the delineation of the treatment area, if necessary.
    b. Report Requirements:
        i. Map and Table: Updated map and table as in Year 1 Season before treatment (see 2.b.i and 2.b.ii. above).
            1. Optional: Repeat the P/I survey in the proposed treatment survey polygons sampling only for EWM (e.g. this may be warranted if the lake is part of a research project).
            2. Map: Map presence/absence of EWM in polygon sites. This map will look like Figure 1, but for each polygon.
        ii. This step may be omitted for whole-lake scale treatments (where it is not necessary to define individual treatment polygons, e.g. when liquid herbicide is applied over large areas).

2. *Conduct Treatment.*
    a. It is best to conduct the treatment as close to ice-out as possible for several reasons.
        i. Many studies have shown that the chemical herbicides are effective at temperatures normally found in lakes just after ice-off.
            1. One exception is endothall products, which are not as effective at temperatures below 50° F, but should still be applied early in the season to avoid impacts to natives.
        ii. The best results are obtained when the biomass of the invasive is still low, so that there is less decomposing plant material and consequently less demand for oxygen that could rob other living organisms of oxygen.
        iii. It is best to treat before the natives are growing fast, so that they are minimally affected by the chemical.
    b. Therefore, treatment should occur in early spring (after ice-out), when EWM is actively growing throughout the proposed treatment areas (optimally around 6 inches tall).
    c. If optimal conditions for treatment have not occurred prior to May 31, consult with the DNR to confirm if treatments may go forward. It is possible that treatments are unnecessary or would be detrimental to the native plant community if conducted too late in the season.

3. *Post-treatment Survey*
    a. A post-treatment survey should be scheduled when native plants are well established, generally mid-July through mid-August.
    b. If treating curly-leaf pondweed (CLP), a post treatment survey needs to be completed before CLP seasonal growth ends, possibly before many natives are easily visible (i.e. mid-June). Consult with the DNR to determine the optimal time to do a post-treatment survey for CLP.
    c. For the post-treatment survey, repeat the P/I for all species in the treatment polygons, as was done the previous summer
        i. For whole-lake scale treatments, a full lake-wide P/I survey should be conducted.
    d. To compute the significance of results from the pre- and post-treatment surveys (pre-treatment survey in summer of Year 1 and post-treatment survey in summer of Year 2) see the *Compute Pre & Post Data sheet*.
    e. Report requirements:
        i. Map: Rake fullness (1,2,3) for all aquatic invasive plants within polygon subsample points. This map will look like Figure 1, but for each polygon.
            1. For whole-lake scale treatments, map results from full lake-wide P/I survey.
        ii. Map other plants in polygon subsamples as appropriate (such as wild rice, other common plants, other common dicots, species of concern, other water-milfoils). This map will look like Figure 1, but for each polygon. You may need a separate map for each species or group of species.
        vi. Table: Frequency of occurrence for all species, including EWM, for all polygon subsample points (use the "Stats" worksheet of the Aquatic Plant Survey Data Workbook).
        iii. Optional Maps: In order to assess species interactions and chemical impacts on non-target plants, map other plants in polygon subsamples as appropriate (such as wild rice, other common plants, other common dicots, species of concern, other water-milfoils). This map will look like Figure 1, but for each polygon. Consult DNR lake manager or APM plan.
        iv. Table: Report the number of sites where each species was found pre- and post-treatment and how the frequency changed with treatment using the pre/post Chi Square evaluation (see example, Table 3.) Please see the *Compute Pre & Post Data sheet*).
        v. Graph: Create bar graph of pre- and post-treatment results for all species, noting significant changes (see example, Figure 5).
        vi. Graph: Report rake fullness for pre- and post-treatment (see example Figure 6.)
        vii. Text: Summarize results from this survey and compare them with the results from the pre-treatment survey in order to
            1. evaluate the effectiveness on target plants,
            2. evaluate any harm or benefit to native plants
            3. revisit goals and recommend a plan for the future
        viii. Identify next year's potential treatment areas for target plants.

Table 3. Wonder Lake

					Increase/
pre-treatment survey total points	85				**Decrease**
post-treatment survey total points	75			**Significant**	(proportional to # sampling points)
	PRE present	POST present	**p**	**change**	
Myriophyllum spicatum	55	0	0.00000	***	-
Ceratophyllum demersum	21	30	0.03829	*	+
Elodea canadensis	52	31	0.01218	*	-
Potamogeton robbinsii	38	60	0.00000	***	+
Potamogeton pusillus	2	15	0.00030	***	+
Potamogeton amplifolius	19	35	0.00117	**	+
Vallisneria americana		18	0.00000	***	+
Chara	15	8	0.20915	**n.s.**	-

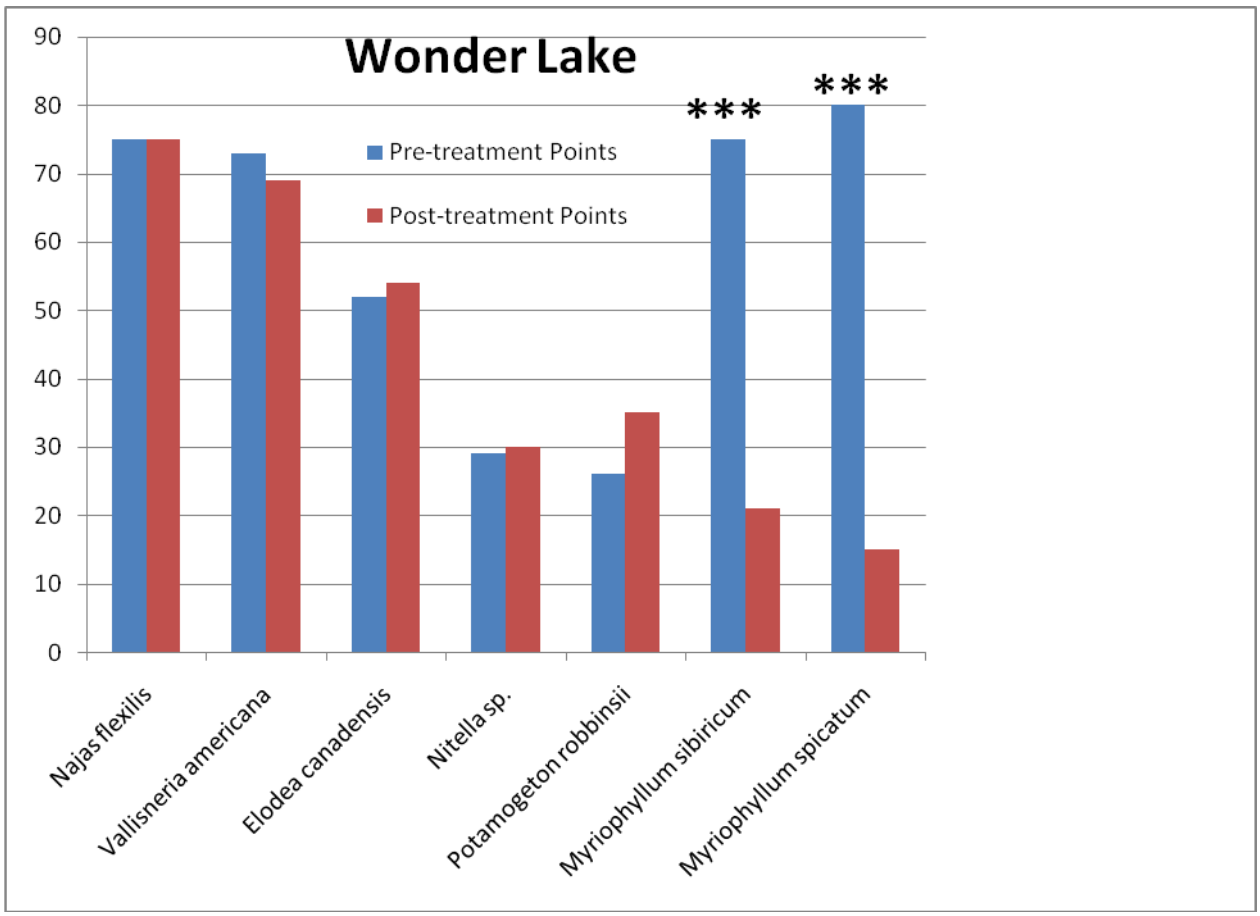


Figure 5.

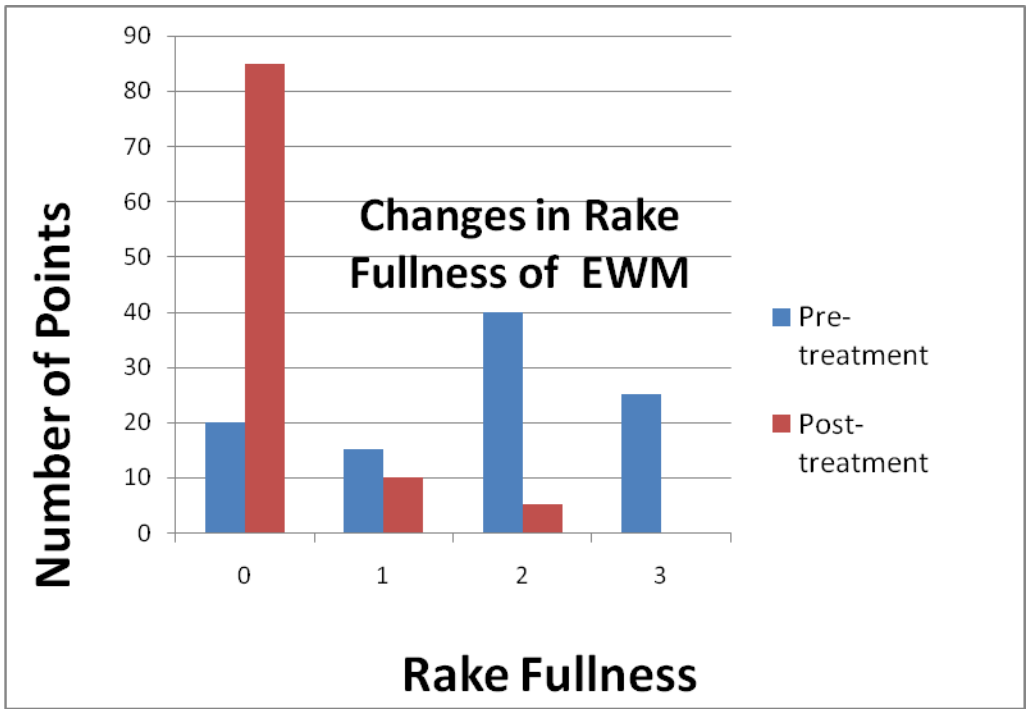
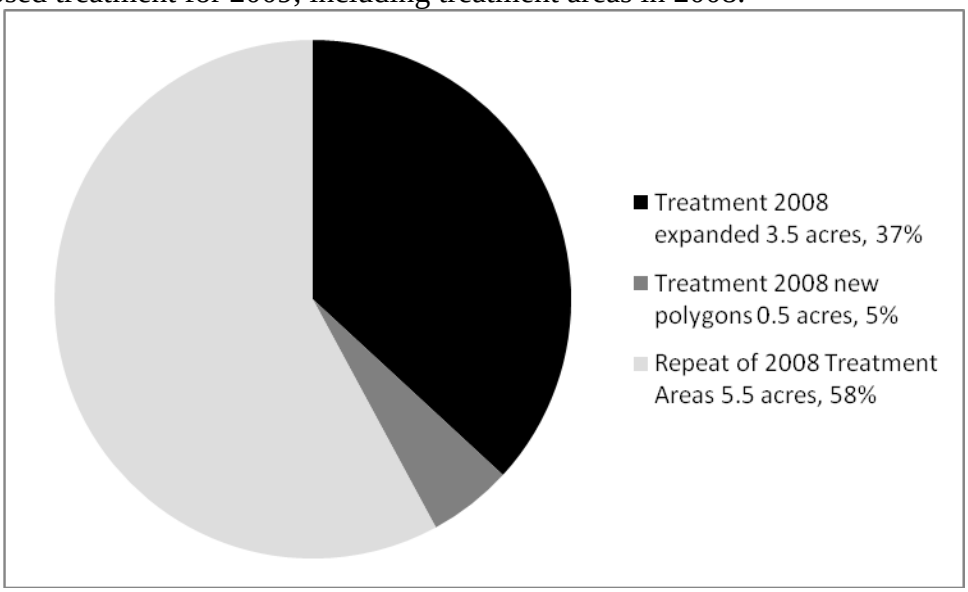


Figure 6.

4. *Get ready for Years 3 and 4*
    a. If further treatments are needed in subsequent years, go back to Year 1, step 2 and repeat all steps.
    b. If one or more polygons treated in Year 2 will be treated again in Year 3 the post-treatment survey results for those polygons in Year 2 can serve as the proposed treatment survey for the treatment to be done on them in Year 3.
    c. If any proposed treatment polygons are different in any way from polygons already treated, the new polygons must be sampled as if they are brand new.
    d. If a whole-lake P/I survey is conducted as part of a whole-lake scale treatment evaluation, this serves as the pre-treatment survey for Year 3.
    e. Report Requirements
        i. Graph or Table: (Optional) In addition to the reporting requirements from all the steps that will be repeated (starting at Year 1, step 2) present a summary of acreages to be treated in the subsequent year(s), partitioned into repeated versus expanded versus new areas (see example, Figure 7.).

Figure 7. Proposed treatment for 2009, including treatment areas in 2008.



5. *Get ready for Year 5*
    a. Follow the protocol for "Get ready for Years 3 and 4" above.
    b. Conduct a lake wide P/I survey (repeat base year) to gauge overall lake community response.
    c. Use the P/I results to update the management plan.
    d. Consult with a DNR lake coordinator to adjust your APM plan goals.

Appendix H

2015 Contracted DASH and Diver Physical Removal Summary Report

MINONG FLOWAGE ASSOCIATION

P.O. Box 167 / Minong, WI 54859
MinongFlowage@Gmail.com

DATE: July 29, 2015

TO: D.A.S.H. – APM Demonstration file **ROUGH DRAFT**

FROM: Dan Maxwell – MFA President

CC:

SUBJECT: Summary of Contractor "EWM Hand-pulling" demonstrations on June 29 & 30, 2015

Executive Summary:

Through the course of the Minong Flowage Association's battle with EWM (Eurasian Water Milfoil), the option of hiring "hand-pulling" contractors has been repeatedly discussed, but not pursued. Since other Wisconsin lake associations have, and are using hand-pulling EWM harvest methods, we decided that it was necessary for us to have a first-hand evaluation of the process in our waters. The anticipated high cost per acre, diver safety in our stump infested waters and process-visibility in our darkly stained waters was always a perceived barrier to such an effort.

However, when unspent funds in our Education grant number AEPP-431-14 became available we sought and received DNR approval for the project.

Our goals were:

1. **To garner first-hand experience with such methods in our waters.** Thus, providing the MFA with a clearer understanding of how these processes might be incorporated in our on-going battle with EWM using non-herbicidal methods.
2. **To generate public interest, understanding and support for the EWM issue.** Thus, garnering more public support for controlling this, and other assorted invasive species in our waters and other lakes in the region.
3. **To inspire either of these two contractors, or other contractors, to more readily offer such services in northwestern Wisconsin.** Thereby enabling a variety of regional lake associations' greater availability to such resources.

Since I instigated and managed most of the project, this document is really a summary of my thoughts, observations and conclusions of the effort. **Hopefully, you, the reader will process this information in light of your own experiences and offer your comments, questions and insights to us. They will be genuinely appreciated.**

Did we achieve our goals?
Yes. We now have a much clearer understanding of the hand-pulling process (with and without a DASH machine) and how we might incorporate them into future efforts. We certainly generated public interest and understanding of the issues. Plus, APM would love a contract for 2016 and DASH would love to get a machine(s) operating in this region.

Is hand-pulling (DASH or APM) cost efficient?
Herbicide costs, safety (pro & con) and efficiencies are the standard by which other options are likely to be judged. Labor-intensive processes are expensive and this was confirmed in my "APM cost per acre" calculations ____on page 10____, which show it to be about double the cost of herbicides. (I'm focused on APM's process because I see the DASH process to being irrelevant until a DASH service is operating in this region, although Many Waters, LLC may be an option for our region.). Regardless of the details, it is hard to look at a pile of harvested EWM that is the size of the grass clippings when I mow my lawn and justify that it is worth the $7,000 we invested.

Can divers operate safely in our waters?
Yes, but certainly within limits. This was confirmed to me with their work in a stumpy area on the Cranberry Flowage on Tuesday morning. However, Matt Berg's insights get my greatest respect and they can be found on ____page 11_____.

Can divers harvest effectively in poor visibility conditions?
Yes, but certainly within limits. This was confirmed to me by APM's work on Minong's bed #15-1 where depths range for ~1.5' to 6.0' and DASH's work on Cranberry's bed #CL-15-2 where the depth exceeded 5'. The divers noted that they always work in obscured visibility due to the sediment that disperses when they disturb the vegetation. However, Matt Berg's insights get my greatest respect and they can be found on ___page 11___.

What do I think of the DASH process?
Everybody enjoyed watching the DASH process, but I don't think it is a viable option for our waters and issues. The financial outlay is significant, but I see the ongoing operation to be the real challenge. Staffing and scheduling issues will take a concerted effort. The best scenario in my mind would be an owner-operator managing it as a small business, much like a landscaper or snowplowing contractor. The right person and a good business plan might qualify for financial assistance on the machine purchase.

What do I think of the APM process?
I like it. Its flexible, its nimble and needs very little oversight. However, if next spring's EWM control situation is identical to 2015's actual treatment parameters (several beds combining to about 15 acres), I would still want to use the herbicide process because it has proven itself to be the most efficient, effective, safe and economical (compared to all other options). I would, however, like to consider hiring them (or a similar organization) for a 3-day effort on optimum bed locations as an ongoing comparison study of efficiency and effectiveness.

Assorted notes, insights, observations & perspectives:

1. **DASH method contractor:**
    a. Naturally DASH & Dredge, LLC ("DASH" for this report)
    b. 4750 Woerner Road / Manitou Beach, Michigan / 49253
    c. Gary Marzolf - Manager
    d. 517/438-0120
    e. DASH@NaturallyDASH.com
    f. NaturallyDASH.com
    g. On-site staff/operators: Gary Marzolf (President), Dan Cullen (long-time diving employee) & Jake Meredith (1st year "top-side manager" employee)
    h. Agreement: 2 days activity on the Cranberry/Minong chain-of-lakes for $5,000, which was fully paid from MFA's funds and will be reimbursed by the DNR grant.
    i. Note: DASH is in the business of contract-harvesting EWM in Michigan **and** selling the DASH machines. They have 5 in inventory, which sell for approximately $30,000 each depending on size. A significant component of his interest in traveling outside of his normal area of operation was due to his interest in developing sales activity.
    j. They usually bring a Personal Watercraft with them to pull the DASH boat to the sites. They didn't have it in this case, so our volunteers did the towing.
    k. 
    l. DASH equipment photo
2. **Hand-pulling method contractor:**
    a. Aquatic Plant Management, LLC ("APM" for this report)
    b. 1696 Silver Beach drive / Lac du Flambeau, Wisconsin / 54538
    c. Andrew McFerrin - Manger
    d. 715/892-2681 (Andrew's cell)
    e. Andrew@AquaticPlantManagement.com
    f. AquaticPlantManagement.com
    g. On-site staff: Nick Johnson (248) 202-7787 and 3 summer laborers.

h. Agreement: 2 days activity on the Cranberry/Minong chain-of-lakes for a maximum of $2,500. We were actually invoiced, and agreed to pay $2,052.50 from MFA funds, which will be reimbursed by a DNR grant. This was $447.50 less than the expected amount due to their delayed arrival on Monday and two thunderstorms on Monday that interrupted harvest activity for most of that day.

i. 

j. APM equipment photo

3. <u>DASH's activity:</u>

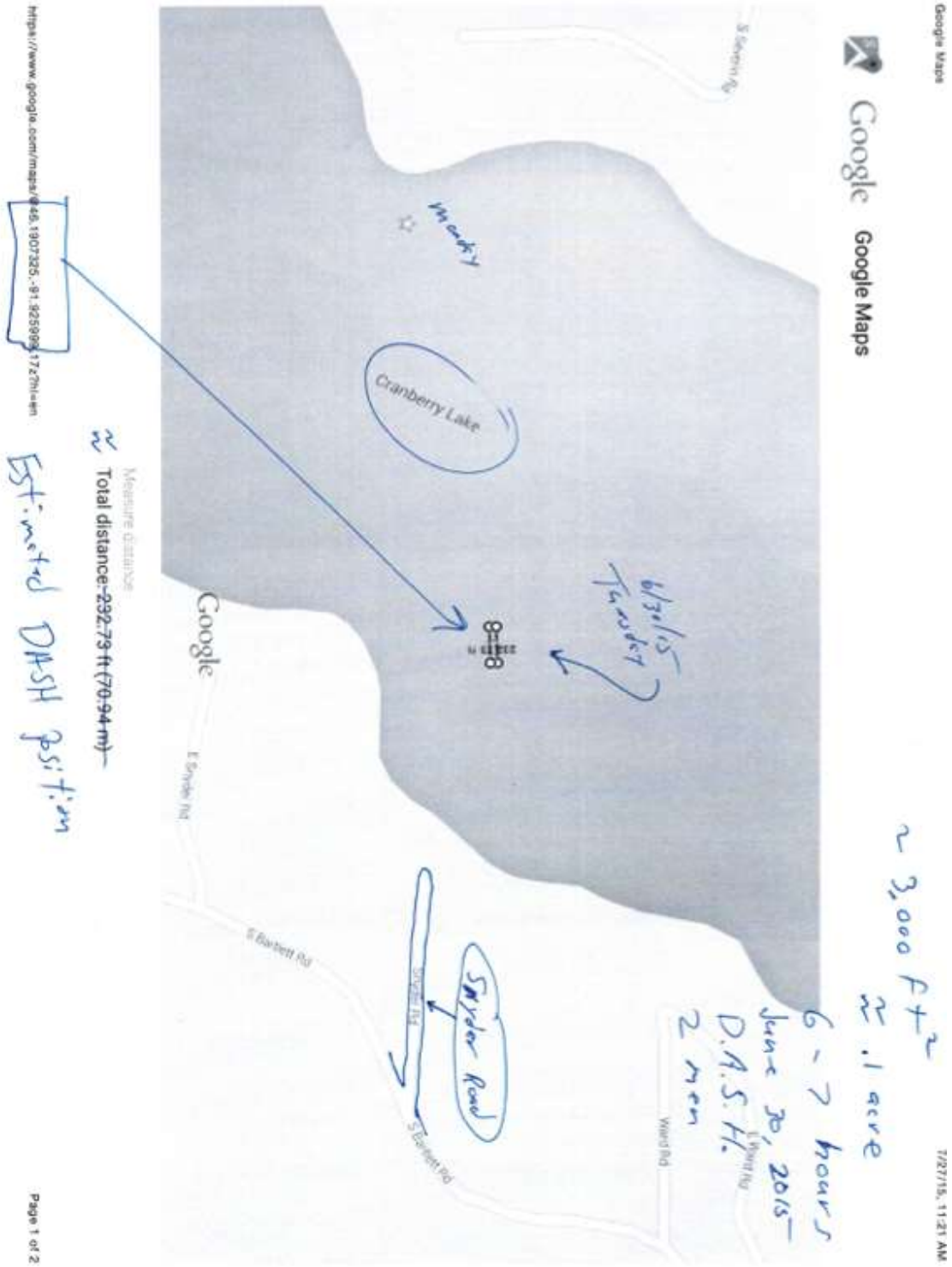
a. DASH started on a site along the west side of Cranberry Lake on Monday, but the EWM density wasn't ideal for demonstrating DASH's efficiency. They were also getting too many native plants, so they moved to a site on the east side of the lake on Tuesday.

b. The "east-side site" was good for the demonstration. However, it was inside of a large bed that was destined for a herbicide treatment which did occur the next day (July 1st). Therefore, monitoring the long-term characteristics (DASH harvest vs. herbicide treatment) of the site may be difficult. On the other hand, maybe this will offer a keen side-by-side insight to the two control methods… I **<u>think</u>** I have identified the GPS point at the center of the harvest activity, but I marked it a few days **<u>after</u>** the activity, so accuracy must be considered as "approximate".

c. The "Rake Fullness Rating" of this site would be a "3", using my interpretation of Matt Berg's scale. It is important to note that the APM crew worked in regions with a rating of "1".

d. 46.1907325, -91.925999 ~ center-point of work site, which I think was in bed # CL-15-2

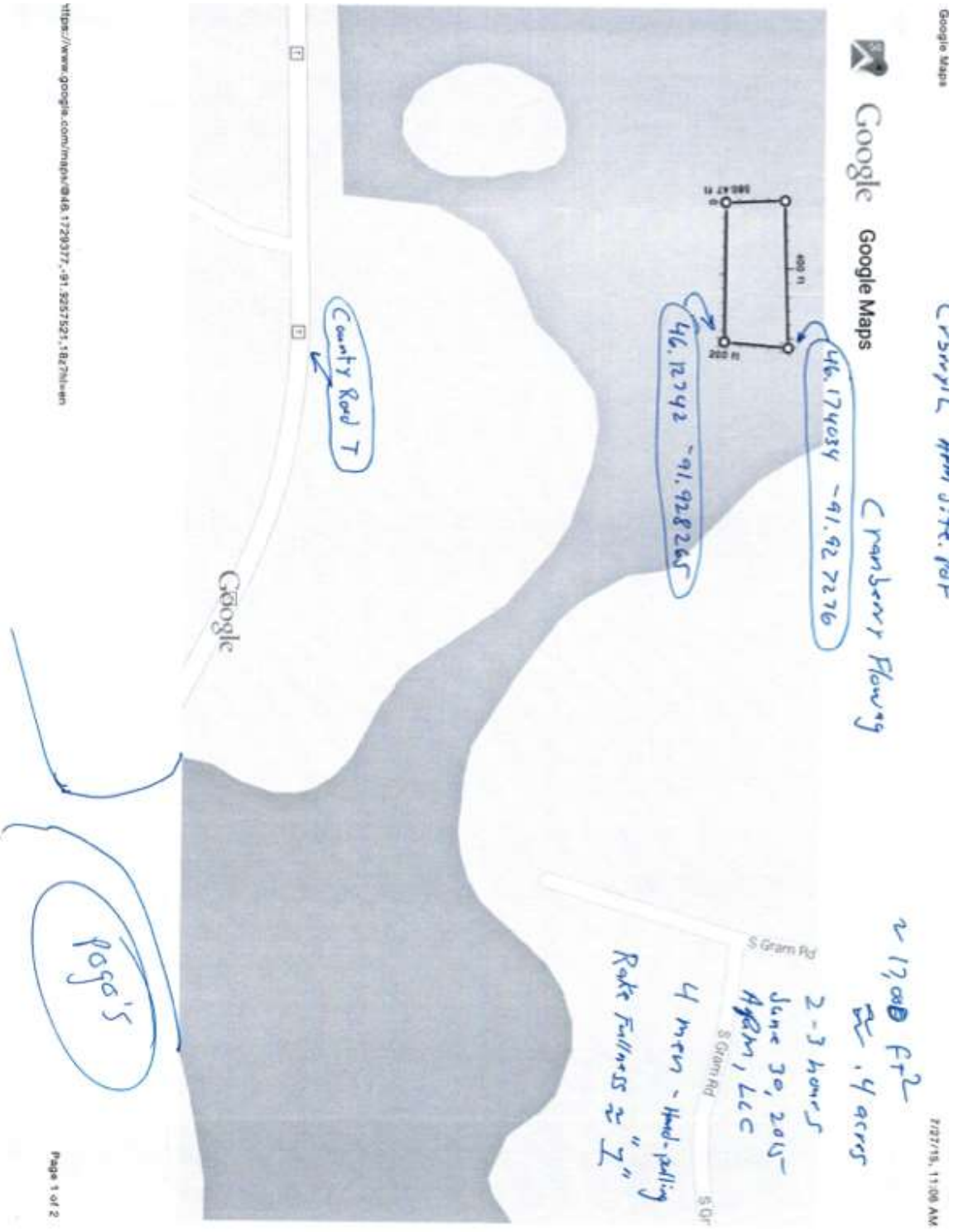
e. .



f. DASH Location.

4. **APM's morning activity:**
   a. APM started Tuesday morning at a site near the southern end of the Cranberry Flowage. It was where the channel takes a 90-degree turn northward.
   b. The four-man crew spent about 3 hours at this site and harvested enough EWM to fill about three 5-gallon pails.

c. The "Rake Fullness Rating" of this site would be a "1", using my interpretation of Matt Berg's scale. It is important to note that the DASH crew worked in a region with a rating of "3".
d. 46.12742, -91.928265 = southeast corner of work site.
e. .

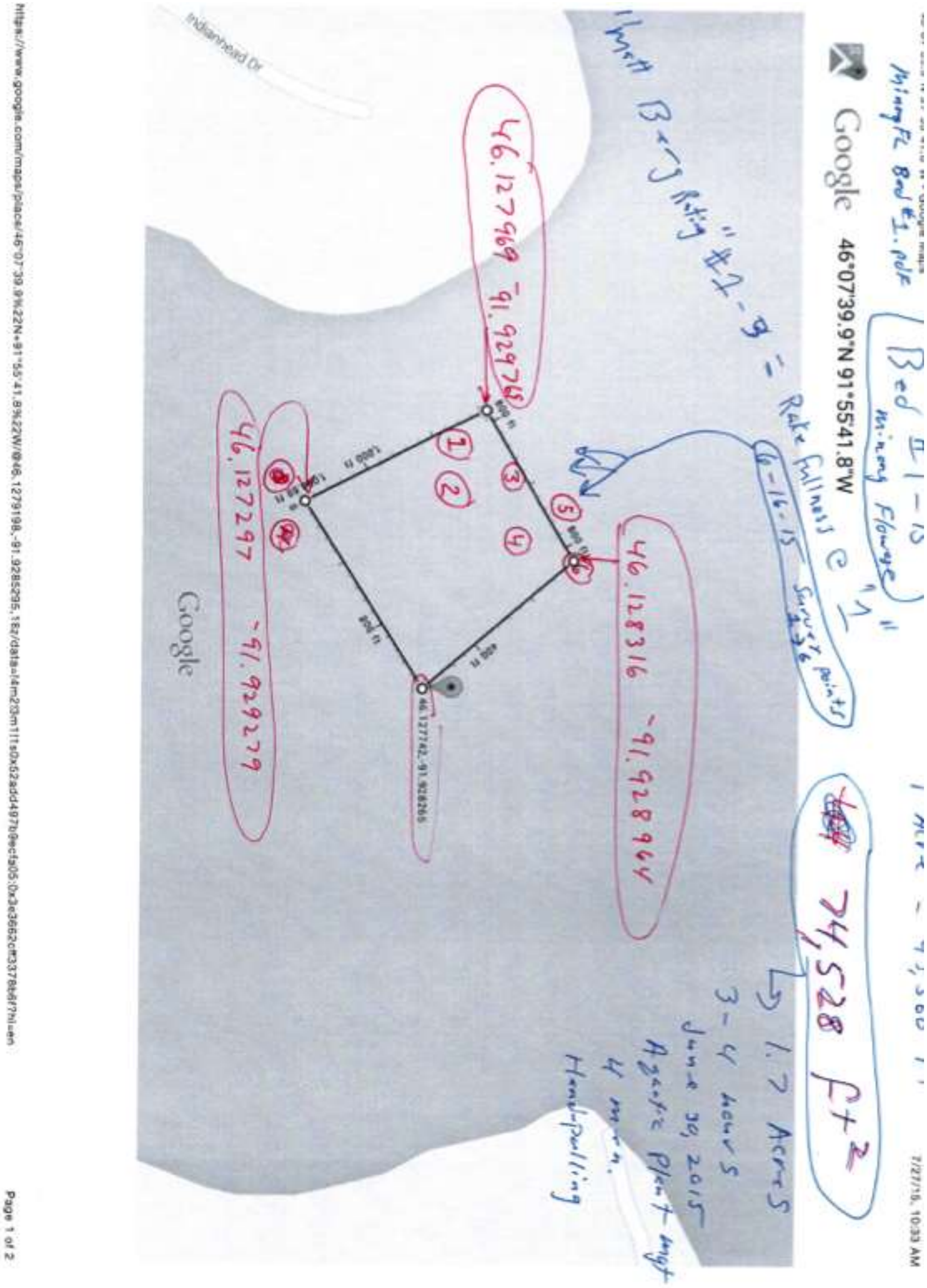


f. APM's morning location

5. <u>APM's afternoon activity:</u>

a. APM started Tuesday afternoon at a site near was at the southern end of the Minong Flowage on “Bed #1-15”.
b. The four-man crew spent about 3 hours at this site.
c. The “Rake Fullness Rating” of this site would be a “1”, using my interpretation of Matt Berg’s scale. It is important to note that the DASH crew worked in a region with a rating of “3”.
d. 46.127297, -91.929279 = southern corner of work site.

e. .



f. APM's afternoon location.

6. **<u>I am a novice at "dropping GPS pins" on a Google Map</u>**, but hopefully you can click on this link and see the pins I dropped for tracking the site locations noted above: https://www.google.com/maps/@46.1567625,-91.9287119,13z?hl=en

7. **<u>Harvest "Value" - APM:</u>**

   a. 4 divers operated in two areas of light EWM density for 1 full day.

b. They harvested about 12 cubic feet of biomass.
c. Raw cost per cubic foot calculation: $2,052.50 / 12 ~= $170 per cubic foot
d. Modified cost per cubic foot calculation: Since they were really only actively harvesting for one day it is more realistic to use the "$1,250 quoted daily rate" / 12 cubic feet ~= $104 per cubic foot
e. They processed about 2 acres of lake-area in one day (combining both locations).
f. Raw cost per acre calculation: $2,052.50 / 2 ~= $1,000 per acre
g. Modified cost per acre calculation: Since they were really only actively harvesting for one day it is more realistic to reference the "$1,250 quoted daily rate" / 2 ~= $625 per acre
h. .

i. The biomass was virtually all EWM, meaning it had very little non-EWM content (native plants, snails, clams, silt, etc.)

8. <u>"Harvest Value" – DASH:</u>

a. 1 diver and 1 topside manager operated in one area of heavy EWM density for 1 full day.
b. They harvested about 33 cubic feet of biomass (~~3 times the quantity of APM).
c. Raw cost per cubic foot calculation: $5,000 / 33 ~= $150 per cubic foot
d. Modified cost per cubic foot calculation: Since they were really only actively harvesting for one day it is more realistic to reference the "$2,500 quoted daily rate" / 33 cubic feet ~= $76 per cubic foot
e. They processed about 0.1 acres of water in one day.
f. Raw cost per acre calculation: $5,000 / 0.1 ~= $50,000 per acre
g. Modified cost per acre calculation: Since they were really only actively harvesting for one day it is more realistic to use the "$2,500 quoted daily rate" / 0.1 ~= $25,000 per acre

h. .

i. The biomass had a noticeable amount of non-EWM content (native plants, snails, clams, silt, etc.

9. <u>Comparative numbers for "loose interpretation":</u>

a. The MFA treated 15.69 acres of EWM on May 19th, 2015 with herbicides. Dale Dressel's services and herbicide cost $4,965, so the cost per acre was $316.44.

b. It took Dale Dressel a portion of one day to perform the treatment of moderate density beds.

c. APM processed about 2 acres of light/moderate density EWM in one day. Therefore, it could be inferred that they could have processed the 15.69 acres in about 8 days (15.69 / 2 = 8 days). Using their quoted daily rate of $1,250 this option would have cost about $10,000 (8 * $1,250 = $10,000), which would equate to $637/acre ($10,000 / 15.69 = $637). Thus, in this "scenario", APM's method is twice as expensive as herbicide method ($637.00 / $316.44 ~= 2).

d. It is important to note that I did not include the cost of Matt Berg's survey service (2015 @ $3,575) in the cost of either calculation because that cost would be incurred regardless.

e. It is also important to consider that herbicide does not depend on visibility and thus offers 100% coverage to an area. Hand-pulling requires that the plant be high enough in the water for the hand-puller to be able to see it. (Thus, short new-growth plants might be passed over in the hand-pulling process?!?).

10. <u>Observers Comments:</u>

a. **<u>Dave Blumer of Lake Education and Planning Services:</u>** Dave is our lake-planning consultant. "Based on how much they were able to suck out yesterday, I agree with you completely. And it is kind of what I expected. I think the system these guys have is very good, and in the right lakes could help a lot. Maybe Cranberry, but not likely much good on Minong unless it is in shallow water where a person can actually walk with their head above water and work on the shallow flats. Again I applaud the guys from Naturally Dash and Dredge for coming over here and demonstrating their equipment. I believe it

could be much more efficiently operated if a lake group or small business would work out all the bugs and find out just where it can be most effectively operated. I doubt they sucked enough EWM out of the one location to have made a significant dent in the bed. Although I am sure they got a lot more than there were able to at the first site along the west shore. If there were not a lot of native plants mixed in with the EWM and the bottom were firmer, and clarity a bit better, selective suction would work better. It did not work well along the west shore, which is why we moved."

b. **Matt Berg of Endangered Resource Services:** Matt is the research biologist who performs our plant survey work. He used the DASH equipment to get a hands-on experience. "I finally got to go out with the divers yesterday after the storms moved through. As not part of the "sales pitch", I thought you might be interested in what I thought. **Super Impressed:** The suction really works/grabs fragments/nothing floats away which is always a big concern with just diver removal. Very little sediment is taken up/based on the bags, and it looks like it pretty much is all immediately returned to the lake. **Less Impressed on Minong/Potential elsewhere?:** If you have low density, it's really hard to find plants in low visibility lakes like Cranberry. However, and this is why I CC'd the Barnes group and others, in good visibility, **this could be an amazing and highly effective tool for CLP** (Eau Claire Lakes) or even some of the really low EWM density lakes I work with (Tomahawk/Sandbar/George/Horseshoe - both/Echo/Gilmore/Ham/Round). I think this could also be a LOT more effective than hand pulling in standing water as well. Having that hose, you could strip that sand bar on the south side of the Minong Flowage bare in no time at all. **Concerned:** Low visibility/underwater obstacles. Granted we were moving around a lot and I was a rookie, but having SNUBA rather than SCUBA means your air is tethered and you're trailing a hose – with two divers, we really got tangled up as we tried to find plants/there wasn't much were we were. In an obstacle filled environment, it would be extremely easy to catch a hose on stumps/become entangled. Because of this, I can confidently say there is **no price point** that I would risk my life of my employee's lives to work in a stump field with low visibility. Maybe others would, but this is way too much liability for me to ever incur. The people diving yesterday didn't seem excited about it either, and they were smoking over gas tanks (you saw that right Blumer ?). The DASH people said they decontaminated before moving from lake to lake, but there were plant fragments on gear/gloves in their boxes. It could have been from earlier in the day, but that's the kind of thing that makes me nervous with someone bringing gear from a long ways away; especially when they're using it to remove Invasives like Starry stonewort that aren't even present in northern WI. **Other thoughts:** I think this could be a great tool to control EWM/CLP in NW WI. The trouble as I see it is the start up cost. 30K plus for a lake to get a system is a lot of upfront cash, but perhaps this is where we are headed. Could the Minong Township or Town of Barnes apply for a grant to purchase one and share locally? Just thinking out loud at this point. Thanks to Dan and Dave for putting this together – it was great to actually get out there and see it."

c. **Andrew McFerrin of Aquatic Plant Mgt.:** "… As for the DASH machine, Nick filled me in on the general process along with the pros and cons of suction harvesting. I have seen these machines in the past and truly believe there is benefit to this technique in specific scenarios. My personal opinion: I believe there is an opportunity for both DASH and snorkel hand-harvesting to work together for maximum effectiveness and efficiency. While I don't know what that would exactly look like, Nick has provided the contact information for the DASH Company you hired and I will make sure to follow up with him. Thank you for setting that up and allowing us to work with the other firm."

d. **Nick Johnson of Aquatic Plant Mgt.:** Nick is the crew-leader for the APM group and he used the DASH equipment to get a hands-on experience. His initial report was, "that thing is *bleep* awesome!"

e. **Dale Dressel of Northern Aquatic Services:** "Yes the (herbicide) treatment happened July 1. I should note that the area 15-4, the one near to which the DASH team operated, well they apparently did not have any GPS information delineating their activities so I took a good look at that bed before treating and could see no signs of their work in that

bed. There was EWM on all of the corners and in the middle, lots of it." (I, Dan Maxwell, think DASH was actually in bed #CL-15-2, but I'm not sure).

f. **Steve Schieffer of Ecological Integrity Services who's consulting business specializes in lake planning consultation and he is also a property owner on Cranberry Lake.** Thus, he does the plant survey work on Cranberry Lake. "I have some experience with DASH and it is really only cost effective in small areas. When the areas get big, it is very labor intensive and calculates out to a very high per acre cost."

g. **Jeremy Bates of the DNR:** (I'll add your comments here, if you wish)

h. **Jason Hayes of the DNR:** (I'll add your comments here, if you wish)

i. **Gus Gustafson, / Barnes Area Assoc.:** (I'll add your comments here, if you wish)

j. **Cranberry Lake Loon Family:**

i. They thought the whole process was very interesting and they plan to nominate Dan Maxwell as an honorary loon at their convention in Orlando next November.

ii. There were 3 chicks. I think the adult on the left is looking for chick #3…

iii. .

k. Loon family

11. **Cranberry Lake & Cranberry Flowage property owners:** Through the course of the pre-event promotional activity and the on-lake activity, a few folks (less than 10) voiced support and/or interest in the effort.
12. **In general, both days had very little "public activity" (boat traffic, etc.) happening, so we got very few casual observers** (other than the Loon family). This surprised me since it was the week leading into the Independence Day holiday. On the other hand, they were "work days" and such traffic didn't really start to pick up on the lakes until Thursday.
13. **Visibility issue:** The DASH diver (using a pumped air-supply system) said he can tell EWM and Curly-leaf Pondweed by feel and thus doesn't necessarily need to see the plant. APM (no pumped, or scuba air supply system) said they look for the visible portion of the plant near the surface and follow it down to the base.

14. **Diver safety issue regarding stumps:** DASH & APM said they can generally work around such obstacles, but they wouldn't venture too far into stump fields. Rather, they focus their efforts in the navigation channels, etc. For example, they both would work the navigation area of the entire Cranberry Flowage. Likewise, they would work the "navigation channel" from Pogo's southward, then eastward towards the mouth of Serenity Bay.
15. **Harvested biomass was disposed in a dry "burn-pile" site behind the Totogatic Campground.** The only complication was that much of the DASH biomass was entangled in the polypropylene mesh onion bags from the DASH process. I removed that which came out easily and brought the rest home to dry out and dispose separately. Large harvest volume would pose a big disposal issue because de-bagging would not be a viable option.
16. **DASH fill rate:** @ 3:00pm when it was "running in-stride", bag fill rate was about a 3 minute cycle, but this is very dependent on the diver's easy access to plants as opposed to searching for plants. I have no doubt that this rate could triple in the right conditions. However, I also envision that if the conditions are that good for high harvest rates, the process would never be able to address the shear volume of EWM in which our lake would be strangled.
17. **DASH effectiveness:** Gary said that herbicide treated areas will grow back at a rate of 100%, while hand-pulled areas grow back at a rate of 10% (presumably because native plants now have a chance to get more firmly established) and that herbicides leave the dead bio-mass in place which can be a problem (some regional laws require bio-mass removal).
18. **DASH future business:** For them to come back for future work, it would be best to book a full week and have all harvest areas well marked in advance. However, we are so far out of their region of operation as to be difficult to support/service us regularly.
19. **APM future business:** They are ready, willing and able to work with us in the future. I would recommend a minimum of 2 days and efficiency would improve with more days.
20. **Volunteer hours:**
    a. Dan Maxwell: Estimated at _____ hours. Final tally to be summarized when final report is complete. My efforts entailed a great deal of pre-event planning, event support on the 29th and 30th, and post-event administration and reporting.
    b. Chuck Youngquist: ___12_?__ hours combined for both days, using his pontoon boat for towing the DASH machine, shuttling people around the site and general safety support.
    c. MFA board meeting discussions: these hours will likely be split between the bathymetric study portion of the grant.
    d. Dave Blumer: paid consultant, not a volunteer
    e. Matt Berg: paid consultant, not a volunteer
21. **Photos:** Additional photos are available on request (Dan.Maxwell@Comcast.net).
22. **Video:** Of the operating DASH machine are available on request (Dan.Maxwell@Comcast.net).