

2018
Invasive Species Report
For The
Rhineland Hydroelectric Project
Oneida County, Wisconsin
FERC project No. 2161



Prepared for:

Expera Specialty Solutions LLC

515 West Davenport Street

Rhineland, Wisconsin 54501

Prepared by: Alan W. Wirt

Table of Contents

1.0 Summary	4
2.0 Introduction	5
3.0 Project area	7
4.0 Methods	8
4.1 Meandering survey.....	8
4.2 Early detection survey.....	8
4.3 Spiny waterflea survey.....	8
4.4 Zebra mussel survey.....	8
4.5 Watercraft inspections	8
4.6 Vouchering.....	8
5.0 Results	9
5.1 Curly-leaf pondweed (<i>Potamogeton crispus</i>)	9
5.2 Purple loosestrife (<i>Lythrum salicaria</i>)	11
5.3 Aquatic forget-me-not (<i>Myosotis scorpioides</i>)	14
5.4 Spiny waterflea (<i>Bythotrephes cederstroemi</i>).....	15
5.5 Zebra mussel (<i>Dreissena polymorpha</i>)	18
5.6 Yellow iris (<i>Iris pseudacorus</i>)	19
5.7 Chinese mystery snail (<i>Cipangopaludina chinensis</i>).....	26
5.8 Rusty crayfish (<i>Orconectes rusticus</i>).....	26
5.9 Eurasian water-milfoil (<i>Myriophyllum spicatum</i>).....	26
5.10 Watercraft inspections.....	26
5.11 Phragmites.....	26
6.0 Mapping tools	28
7.0 Literature cited	28

List of Tables

Table 1: Rhinelander Flowage curly-leaf pondweed data.....	5
Table 2: Rhinelander Flowage purple loosestrife data.....	11
Table 3: Aquatic Forget-Me-Not sampling point data sheet.....	11
Table 4: Spiny waterflea sampling point data sheet.....	16
Table 5: Zebra Mussel sampling point data sheet.....	18
Table 6: Yellow Iris sampling point data sheet.....	18

List of Figures

Figure 1: Rhinelander Flowage curly-leaf pondweed locations.....	10
Figure 2: Rhinelander Flowage curly-leaf pondweed locations.....	10
Figure 3: Rhinelander Flowage above dam Purple Loosestrife locations.....	12
Figure 4: Rhinelander Flowage below dam Purple Loosestrife locations.....	13
Figure 5: Rhinelander Flowage Aquatic Forget-Me-Not locations.....	15
Figure 6: Site locations for spiny waterflea samples	16
Figure 7: Site locations for zebra mussel samples	17
Figure 8: Site locations for Yellow Iris.....	22
Figure 9: Phragmites map location.....	27

List of Appendices

Appendix 1: Order amending invasive species management plan.....	25
Appendix 2: Rhinelander Flowage boat landing.....	29
Appendix 3: Wisconsin Department of Natural Resources aquatic invasive species early detection monitoring protocols	30
Appendices 3A.....	45
Appendices 3B.....	47
Appendices 3C.....	51
Appendices 3D.....	52
Appendices 3E.....	53
Appendix 4: Watercraft inspection protocol.....	54
Appendix 5: Form 3200-120.....	59
Appendix 6: Spiny water flea protocol.....	60
Appendix 7: Zebra mussel protocol.....	60

1.0 SUMMARY

Aquatic Invasive Species (AIS) monitoring and watercraft inspections began on June 1, 2018 and were completed on August 31, 2018. Yellow Iris, Chinese mystery snail, Rusty Crayfish, Aquatic-Forget-Me-Not, Purple Loosestrife, and Phragmites were observed in 2018.

Curly-leaf pondweed was not observed for the second year in a row. All known locations of CLP were visited and systematically searched and with no presence of CLP during the 2018 survey.

During meandering surveys in 2018 two new locations were found to contain Purple Loosestrife. The two locations have not, in prior years of observation, contained Purple Loosestrife. The first location was up river in the marsh system. Five plants were removed and disposed of. The second location was below the dam and located by the old boat landing on the river. There again the plants were removed completely and disposed of. All five locations that were observed during the 2017 survey contained young plants in 2018. The locations in both Thunder and Creek lake where the plants were found in 2018 were removed and disposed of. . The locations were first noted and plants were removed during the 2016 season. The same locations contained plants during the 2017 and 2018 season.

Yellow Iris was present throughout the project boundaries. During the 2015 survey locations were noted with GPS locations and mapped to detect any increase or decrease of populations. During the 2018 survey the Yellow Iris locations were observed to decrease from 156 in 2017 to 141 locations in 2018.

Chinese mystery snails have been previously noted and in 2018 were located within the entire project boundaries. The largest populations were noted in the upper river portions.

Rusty crayfish were also found throughout the project boundaries and have been previously noted to be in the system.

Eurasian water-milfoil was not observed during any surveys and it has not been previously reported.

Aquatic Forget-Me-Nots were first observed in 2013 and placed on the restricted list by the state of Wisconsin in 2015. Ten locations were observed in 2016 and marked with GPS locations to

further monitor population increases or decreases. During the 2018 survey Aquatic Forget-Me-Nots showed no increase in locations observed.

Phragmites was noted by a private property owner within the project boundaries. The site had been previously noted and monitored for five years during surveys with no growth in occupation of shoreline. Samples have were taken and sent in for genetic testing at University of Wisconsin Whitewater for determination of species.

Watercraft inspections were conducted with 97 total hours logged, 70 hours were spent at Hodag Park and 27 hours off of Apperson Drive. There were 309 people contacted and 141 watercrafts inspected.

2.0 Introduction

The Rhinelander Flowage is comprised of Boom Lake, Bass Lake, Thunder Lake and Lake Creek and extends through Tomahawk, Newbold, Pine Lake, and Pelican townships in Oneida County. The Rhinelander Flowage was formed when a mud and timber dam was constructed on the Wisconsin River in 1882. In 1903, the present dam was constructed for the purpose of generating power for the new paper mill (IMFWisconsin, 2013). Aquatic invasive species (AIS) were first documented in the Rhinelander Flowage in 2006 with the discovery of rusty crayfish and purple loosestrife. It is possible that both species were present prior to that and just not reported.

AIS are of concern because they can threaten the balance and diversity of a water body. AIS tend to be aggressive, altering habitat in which they invade and can out-compete native species for food and shelter. They can create recreational issues that become a nuisance to the public. AIS can also have economic impacts, as much money and labor can be spent monitoring and mitigating their impacts (McFarlane 2012).

The Federal Energy Regulatory Commission license for the operation of the Rhinelander Flowage dam pertaining to article 406 requires the licensee to file an invasive species management plan to monitor species such as, purple loosestrife, Eurasian water-milfoil and other possible invasive species (Appendix 1). The invasive species management plan requires the

licensee to conduct annual surveys for AIS and file annual reports with the Federal Energy Regulatory Commission.

Activities to meet requirements as listed in the plan could include:

- Watercraft inspections
- AIS monitoring
- Public education and involvement
- Updating signage as needed
- Aquatic plant surveys
- AIS mapping
- AIS removal
- Other AIS related activities

The activities during the 2018 survey included the following:

- 1) Monitor existing AIS populations, which include Curly-leaf pondweed, Purple Loosestrife, Rusty crayfish, Aquatic Forget-Me-Nots, and Chinese mystery snails.
- 2) Search for new AIS, to include Eurasian water-milfoil, zebra mussel and spiny waterflea
- 3) Perform watercraft inspections
- 4) Control existing AIS populations as appropriate

3.0 Project area

The Rhinelander Flowage is a soft water drainage system having slightly alkaline, clear water of low transparency. Sand is the predominant littoral material (75 percent) with muck (23 percent) and very limited area of gravel. The shoreline is predominantly upland with wetland of shrub type adjoining portions of the flowage; a good development of wild rice exists in the upper end (Andrews, 1966).

There are eight boat landings throughout the Rhinelander Flowage. Five landings are located along the upper portion. The Town of Pike has three of them, two off of River Rd and one along Journeys End Rd. The Town of Newbold has two, one off of Surf Rd and the other off of Apperson Dr. There is another public boat landing on Boom Lake in Hodag Park. Lake Creek has a landing off of River Rd and Bass Lake has one access point off of Moon Lite Bay Rd (Appendix 3).

The upstream and downstream survey limits for the Rhinelander Hydroelectric Project were defined as follows;

- The water and shoreline of the Rhinelander Flowage from N45° 44' 10.1", W89° 31' 08.4" WGS84 to approximately 0.5 miles upstream from the McNaughton Road Bridge to the dam at the Rhinelander Hydroelectric Project.
- The waters and shoreline of the power canal bypass reach, and tailrace from the dam at the Rhinelander Hydroelectric Project downstream to N45° 38' 12.4", W 89° 25' 0.00" WGS84 approximately 400' downstream of the Davenport Street Bridge.
- Waters and shoreline of Boom Lake, Bass Lake, Thunder Lake and of Lake Creek; up to the confluence with the stream from South Pine Lake at 45° 40' 24.5" W 89° 24' 57.5" WGS84 (Appendix 3).

4.0 Methods

4.1 Meandering survey

A meandering survey consists of driving a boat slowly along the shoreline of a lake between shallow water and maximum rooting depth of aquatic plants or 100 feet from shore, whichever comes first. Rake throws; D-nets, snorkeling, aqua scopes, and underwater cameras can be used as necessary to aid in searching for AIS during a meandering survey.

4.2 Early detection survey

This is a baseline lake-wide AIS monitoring survey with standard operating procedures - see Appendix 4.

4.3 Spiny waterflea survey

See Appendix 6, waterflea tows, page 60

4.4 Zebra mussel survey

See Appendix 7, veliger tows, page 60

4.5 Watercraft inspections

Watercraft inspections are performed by a trained individual at a boat landing. See Appendix 5 for specific inspection methodology. All data is collected on Form 3200-120 (Appendix 6) and then entered into the WDNR SWIMS database.

4.6 Vouchering

All newly discovered AIS have specimens collected and sent to an appropriate laboratory for verification. Vouchering protocols can be found in Appendix 3, voucher collection protocol, page 34.

5.0 Results

Curly-leaf pondweed, purple loosestrife, aquatic forget-me-not, yellow iris, Chinese mystery snail, rusty crayfish, Phragmites and Eurasian water-milfoil were monitored using meandering and early detection survey methods. The meandering survey was completed by from June 1st, through August 31, 2018.

5.1 Curly-leaf pondweed

Curly-leaf pondweed was not located within the project boundaries in 2018. All previously known locations were revisited and checked, no rooted CLP was located.

Table 1: Rhinelander Flowage curly-leaf pondweed (CLP) data

Site	Latitude	Longitude	2018 Status	Comments
CLP 1	45.68529116	-89.44893605	Not Present	No rooted CLP observed
CLP 2	45.68414	-89.45236	Not Present	No rooted CLP observed
CLP 3	45.68498841	-89.44790868	Not Present	No rooted CLP observed
CLP 4	45.68285	-89.45226	Not present	No rooted CLP observed
CLP 5	45.64882519	-89.42564551	Not Present	No rooted CLP observed
CLP 6	45.65847	-89.42947	Not Present	No rooted CLP observed
CLP 7	45.68147	-89.44308	Not Present	No rooted CLP observed
CLP 8	45.65043	-89.41584	Not Present	No rooted CLP observed

Figure 1: Rhinelander Flowage curly-leaf pondweed (CLP) locations



*** Upper Flowage CLP prior locations

Figure 2: Rhineland Flowage Curly-Leaf Pondweed (CLP) locations



*** Boom Lake prior known locations of CLP.

5.2 Purple loosestrife

Purple loosestrife was observed in five previously known locations of the Rhinelander Flowage and two new locations during the 2018 survey. Five locations on Creek Lake and Thunder lakes, locations were observed in 2017 and plants were pulled at that time, plant were again removed in 2018 in the same locations. Two new locations were observed in 2018. One in the marsh region of the upper flowage and the second below the dam downstream from the old boat landing. All plants were pulled and disposed of. GPS data was taken and mapped to assist with future management of the Purple loosestrife.

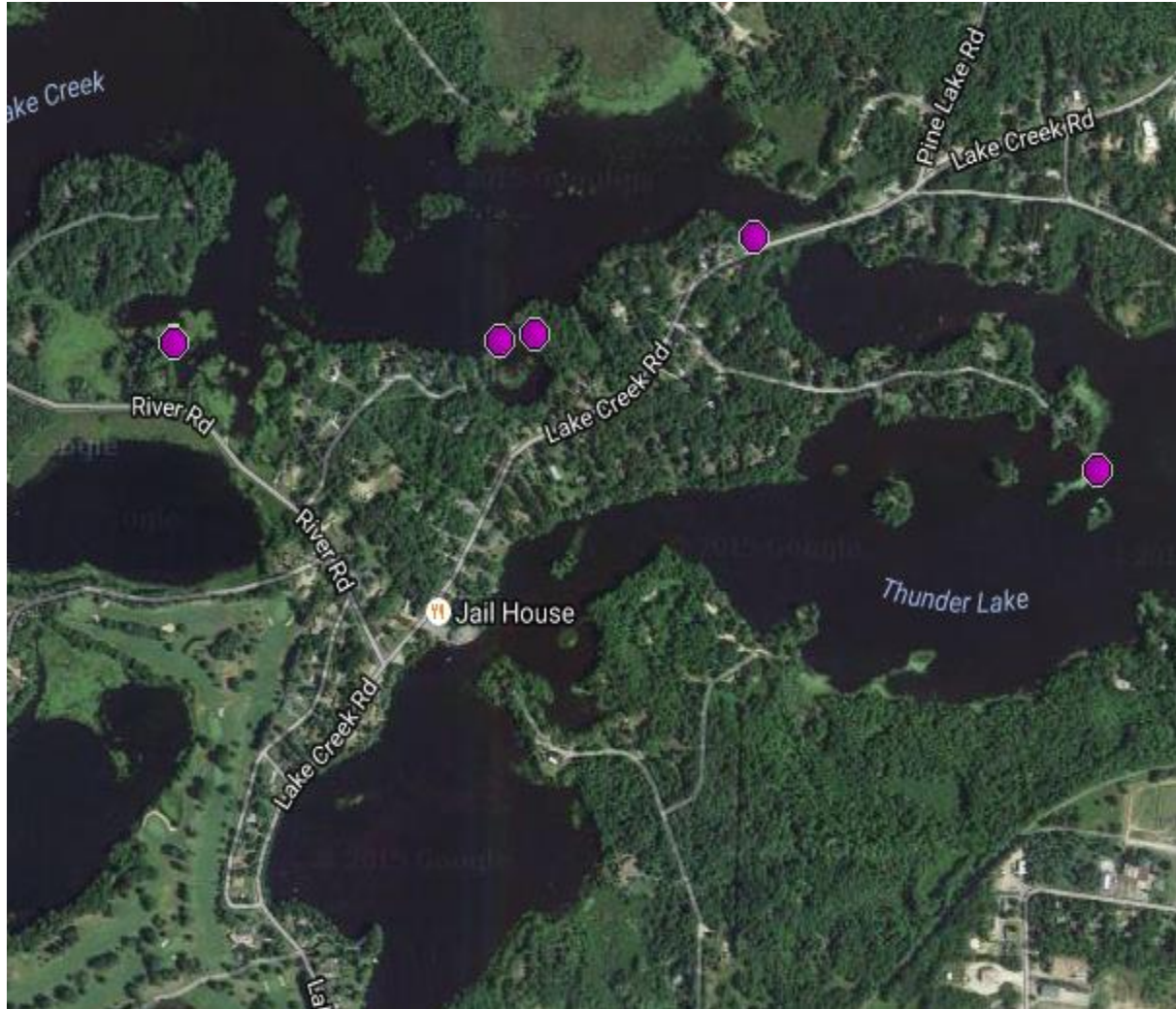
Table 2: Rhinelander Flowage purple loosestrife (PL) data

SITE #	Latitude	Longitude	# OF PLANTS	PRESENT LAST YEAR?	PULLED THIS YEAR?	PULLED LAST YEAR?	BEEBLE DAMAGE?	YEAR FIRST OBSERVED	COMMENTS
PL001	45.66255558	-89.43352777	2	NO	NO	No	NO	2006	NOT PRESENT
PL010	45.65824997	-89.42256	10	NO	NO	NO	NO	2007	NOT PRESENT
PL016	45.65930558	-89.42255552	1	NO	NO	NO	NO	2009	NOT PRESENT
PL017	45.6570278	-89.42277781	0	NO	NO	NO	NO	2009	NOT PRESENT
PL018	45.65394443	-89.42980553	0	NO	NO	NO	NO	2009	NOT PRESENT
PL020	45.65931	-89.41575	0	NO	NO	NO	NO	2010	NOT PRESENT
PL023	45.66278	-89.43389	2	NO	NO	NO	NO	2010	NOT PRESENT
PL024	45.66067	-89.43917	0	NO	NO	NO	NO	2010	NOT PRESENT
PL025	45.66092	-89.43869	0	NO	NO	NO	NO	2010	NOT PRESENT
PL026	45.65837586	-89.42275417	0	NO	NO	NO	NO	2011	NOT PRESENT
PL036	45.66104	-89.42197	1	NO	NO	NO	NO	2012	NOT PRESENT
PL037	45.66029	-89.42274	2	NO	NO	NO	NO	2012	NOT PRESENT
PL002	45.63680554	-89.41697225	10	NO	NO	NO	NO	2006	NOT PRESENT
PL004	45.63836114	-89.4155278	2	NO	NO	NO	NO	2006	NOT PRESENT
PL005	45.63891669	-89.41616667	2	NO	NO	NO	NO	2006	NOT PRESENT
PL006	45.63916664	-89.41708331	0	NO	NO	NO	NO	2006	NOT PRESENT
PL008	45.63994448	-89.41938892	0	NO	NO	NO	NO	2006	NOT PRESENT

PL009	45.63911115	-89.41669447	0	NO	NO	NO	NO	2006	NOT PRESENT
PL011	45.63813885	-89.41547222	5	NO	NO	NO	NO	2007	NOT PRESENT
PL012	45.63999997	-89.41944441	0	NO	NO	NO	NO	2007	NOT PRESENT
PL013	45.63991665	-89.41927778	0	NO	NO	NO	NO	2007	NOT PRESENT
PL015	45.64019443	-89.41977776	0	NO	NO	NO	NO	2008	NOT PRESENT
PL019	45.63680554	-89.41602778	4	NO	NO	NO	NO	2009	NOT PRESENT
PL021	45.63867	-89.41572	0	NO	NO	NO	NO	2010	NOT PRESENT
PI100	45.66042	-89.42264	5	YES	YES	YES	NO	2013	NOT PRESENT
PL101	45.6396395	-89.4190469	1	YES	NO	Yes	NO	2017	NOT PRESENT
PL102	45.6387506	-89.4161555	5	YES	NO	Yes	NO	2017	NOT PRESENT
PL103	45.6381523	-89.4157076	3	YES	NO	Yes	NO	2017	NOT PRESENT
PL104	45.6384299	-89.4166946	7	YES	NO	Yes	NO	2017	NOT PRESENT
<i>PL105</i>	45.6675803	-89.4056225	1	YES	YES	YES	NO	2016	PLANT PULLED
<i>PL106</i>	45.6675953	-89.397661	1	YES	YES	YES	NO	2016	PLANT PULLED
<i>PL107</i>	45.6690348	-89.392790	9	YES	YES	YES	NO	2016	PLANT PULLED
<i>PL108</i>	45.6657959	-89.385194	1	YES	YES	YES	NO	2016	PLANT PULLED
<i>PL109</i>	45.6676853	-89.403921	1	YES	YES	YES	NO	2016	PLANT PULLED
<i>PL110</i>	45.70477	-89.50222	5	NO	YES	NO	NO	2018	PLANT PULLED
<i>PL112</i>	45.63469	-89.41797	7	NO	YES	NO	NO	2018	PLANT PULLED

Site #'s in *italics* indicate purple loosestrife presence in 2018

Figure 3: Rhinelander Flowage above dam purple loosestrife (PL)



***2016 Purple Loosestrife (PL) locations

Figure 4: Rhinelander Flowage 2018 new purple loosestrife (PL)



**Purple loosestrife location in 2018 not found in 2017.

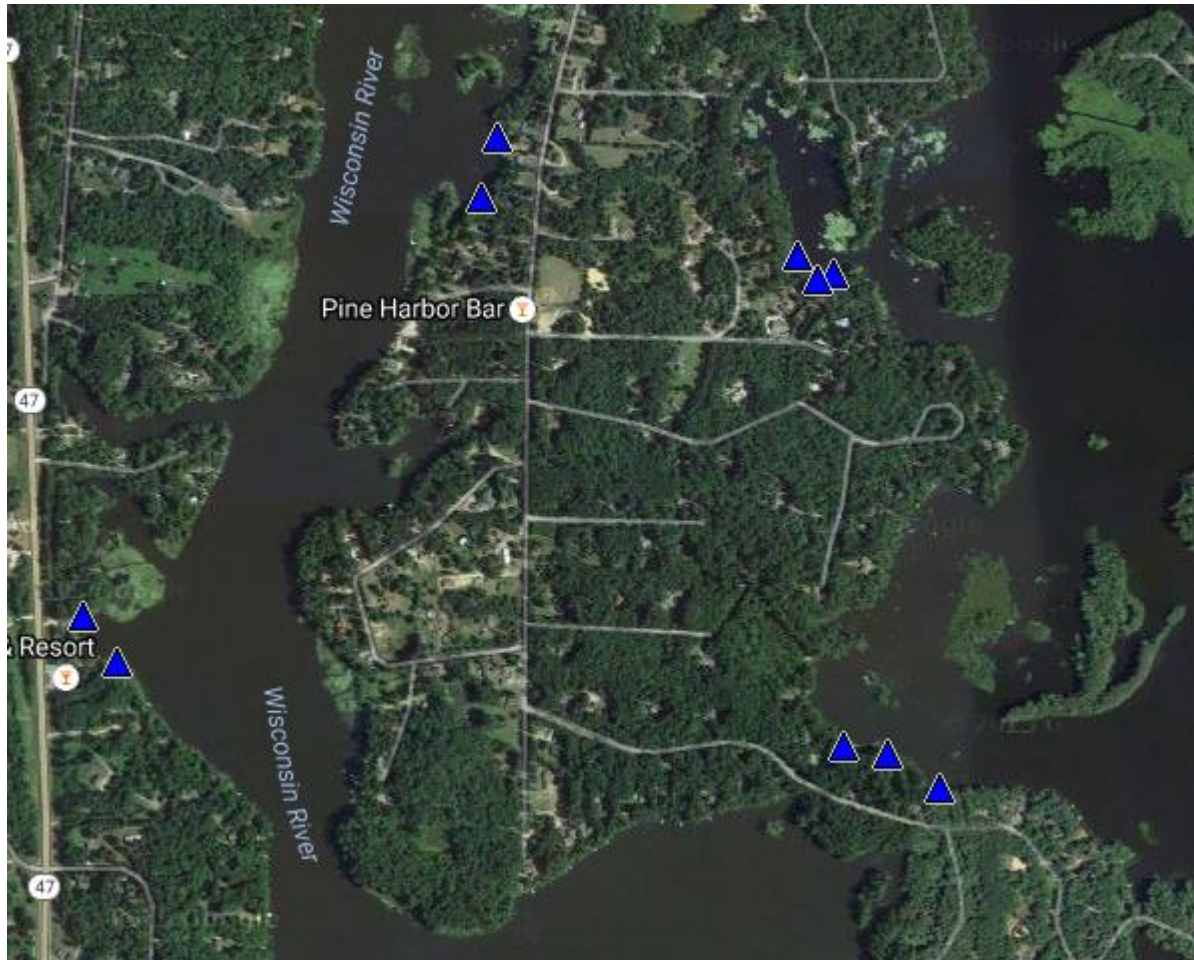
5.3 Aquatic forget-me-not

In surveys conducted during 2018 Aquatic forget-me-nots were observed in the same locations that were documented during the 2017 survey. No new locations were observed during the 2018 survey. Aquatic forget-me-nots were first documented in 2013, and will be continued to be monitored. Aquatic forget-me-not have been added to the Wisconsin invasive species restricted list in 2015.

Table 3: Aquatic Forget-Me-Not Data

Site Number	Latitude	Longitude	Present/Absence 2016
001	45.6606522	-89.4337106	Present
002	45.6609071	-89.4344616	Present
003	45.6605622	-89.4340539	Present
004	45.6529283	-89.4314146	Present
005	45.6534382	-89.4325304	Present
006	45.6535582	-89.4334745	Present
007	45.6617770	-89.4412422	Present
008	45.6626767	-89.4408989	Present
009	45.6548181	-89.4490528	Present
010	45.6555080	-89.4497824	Present

Figure 5: Locations of Aquatic Forget-Me-Not

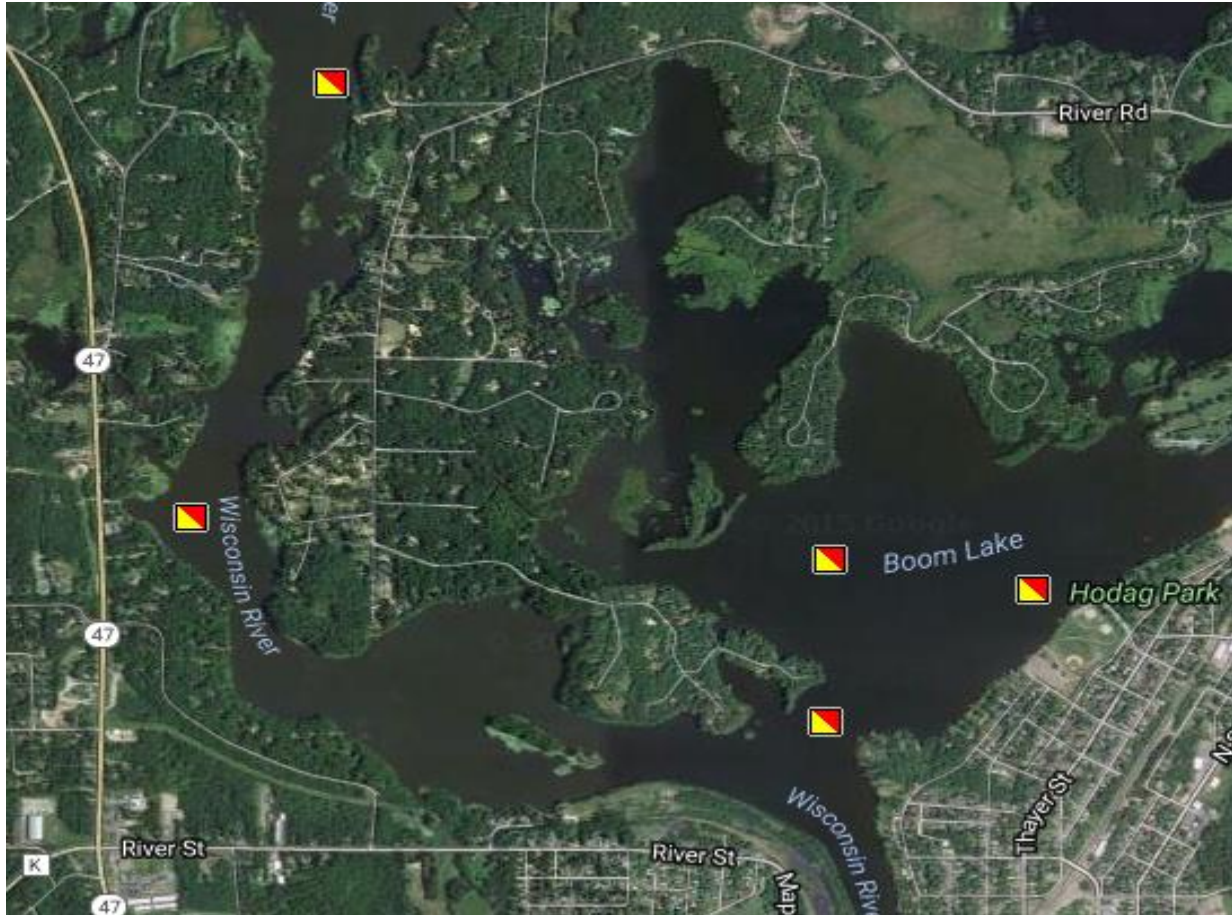


***Aquatic Forget- Me-Not locations for 2018

5.4 Spiny waterflea

Spiny waterflea were monitored using waterflea survey methods. The survey was completed on July 20th, 2018 with five sites being sampled during survey for the presence of spiny waterflea (Figure 6). After collection, samples were analyzed for the presence of Spiny waterflea following standard laboratory protocol and Wisconsin DNR standard operating procedures. No spiny waterfleas have been detected in surveys completed during the 2018 monitoring season.

Figure 6: Site locations for spiny waterflea samples in the Rhinelander Flowage



***Spiny waterflea sampling point map locations.

Table 4: Spiny waterflea sampling point data sheet

Site	Secchi Depth (m)	Sample Type	Method	Results
1	1.25	sediment	Ekman dredge	No Presence
2	1.25	sediment	Ekman dredge	No Presence
3	1.25	sediment	Ekman dredge	No Presence
4	1.25	sediment	Ekman dredge	No Presence
5	1.25	sediment	Ekman dredge	No Presence

5.5 Zebra mussel

Zebra mussels were monitored using veliger survey methods. Three sites were sampled on July 28th, 2018 (Figure 7). Samples were analyzed in a laboratory for presence of absence utilizing state lab protocol. Table 5 lists information collected as part of the sites sampled. No zebra mussel veligers were detected during the 2018 sampling season.

Figure 7: Site locations for zebra mussel samples in the Rhinelander Flowage



*** Zebra Mussel sampling point mapping

Table 5: Zebra mussel sample points data sheet

Site	Secchi Depth (m)	Depth Sampled (m)	Number of Tows	Results
1	1.25	2	1	No Presence
2	1.25	6	1	No Presence
3	1.25	2	1	No Presence

5.6 Yellow iris

Yellow Iris was observed throughout the project boundaries in 2018. Utilizing the mapping and GPS points that were collected during the 2016 season, there showed a decrease in the number of locations(15 less) of Yellow Iris within the project boundaries during 2018 surveys. Locations where it had been observed during the 2017 season it remained and no new locations were observed during the survey. Yellow Iris locations observed in 2018 show a decrease in plant shoreline occupation by comparison of previous observations.

Table 6: Yellow Iris data within Project boundaries.

Location Name	Latitude	Longitude	2015 Present/Absent
YI1	45.704063	-89.512608	Not Present 2018
YI2	45.704036	-89.512562	Not Present 2018
YI3	45.704035	-89.512409	Not Present 2018
YI4	45.704033	-89.512361	Present in 2018
YI5	45.704072	-89.512128	Present in 2018
YI6	45.704025	-89.51136	Present in 2018
YI7	45.703941	-89.511554	Present in 2018
YI8	45.703903	-89.51087	Present in 2018
YI9	45.703911	-89.510837	Present in 2018
YI10	45.704411	-89.5023	Present in 2018
YI11	45.706299	-89.493234	Present in 2018
YI12	45.681756	-89.455276	Present in 2018

YI13	45.681232	-89.454803	Present in 2018
YI14	45.679965	-89.441661	Present in 2018
YI15	45.670474	-89.436865	Present in 2018
YI16	45.657405	-89.447711	Present in 2018
YI17	45.654826	-89.449434	Present in 2018
YI18	45.65144	-89.44039	Present in 2018
YI19	45.641528	-89.420297	Present in 2018
YI20	45.641511	-89.420206	Not Present 2018
YI21	45.641554	-89.420066	Present in 2018
YI22	45.641579	-89.420004	Present in 2018
YI23	45.643848	-89.420375	Present in 2018
YI24	45.645368	-89.420941	Present in 2018
YI25	45.6484059	-89.4212008	Present in 2018
YI26	45.6484434	-89.4208038	Present in 2018
YI27	45.6482859	-89.4197094	Present in 2018
YI28	45.6483759	-89.418776	Present in 2018
YI29	45.6492534	-89.4174778	Present in 2018
YI30	45.6501459	-89.4162011	Present in 2018
YI31	45.6504459	-89.4157183	Present in 2018
YI32	45.6505284	-89.4156003	Present in 2018
YI33	45.6511209	-89.4146562	Present in 2018
YI34	45.6517058	-89.4142056	Present in 2018
YI35	45.6519233	-89.4140232	Not Present 2018
YI36	45.6525083	-89.4133687	Present in 2018
YI37	45.6526508	-89.412843	Present in 2018
YI38	45.6535882	-89.4109333	Present in 2018
YI39	45.6536482	-89.4106972	Present in 2018
YI40	45.6537007	-89.4105792	Present in 2018

YI41	45.6541882	-89.4091415	Present in 2018
YI42	45.6542257	-89.4089806	Present in 2018
YI43	45.6544356	-89.4085622	Present in 2018
YI44	45.6551331	-89.4073498	Present in 2018
YI45	45.6551931	-89.4072318	Present in 2018
YI46	45.655433	-89.4063413	Present in 2018
YI47	45.6554705	-89.406116	Present in 2018
YI48	45.6560855	-89.4050324	Not Present 2018
YI49	45.656093	-89.404968	Not Present 2018
YI50	45.6560405	-89.4047749	Not Present 2018
YI51	45.6560255	-89.4047105	Present in 2018
YI52	45.6561904	-89.4040561	Present in 2018
YI53	45.6577652	-89.410429	Present in 2018
YI54	45.6603673	-89.4130361	Present in 2018
YI55	45.6607647	-89.4150746	Present in 2018
YI56	45.6601198	-89.4148707	Present in 2018
YI57	45.6597899	-89.414506	Present in 2018
YI58	45.6584551	-89.4140553	Present in 2018
YI59	45.6584139	-89.4140124	Present in 2018
YI60	45.6583239	-89.4139212	Present in 2018
YI61	45.6590625	-89.4177997	Present in 2018
YI62	45.6596549	-89.4182611	Present in 2018
YI63	45.6598799	-89.4187117	Present in 2018
YI64	45.6603373	-89.4202888	Present in 2018
YI65	45.6608996	-89.4213402	Present in 2018
YI66	45.6609746	-89.4220269	Present in 2018
YI67	45.6584926	-89.4227135	Present in 2018
YI68	45.6642438	-89.4261467	Present in 2018

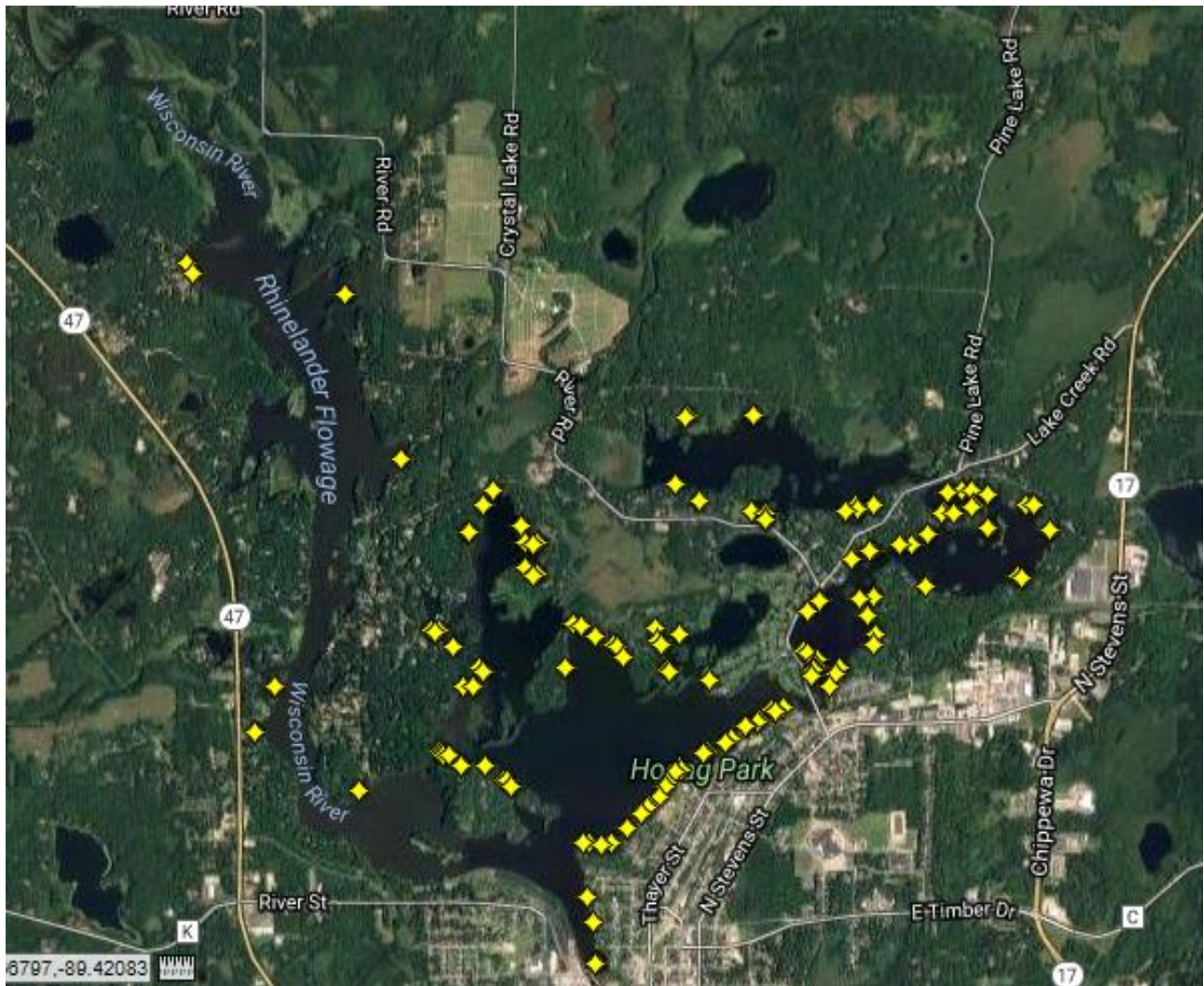
YI69	45.6638464	-89.4254923	Present in 2018
YI70	45.6638614	-89.4252563	Present in 2018
YI71	45.6639814	-89.4251919	Present in 2018
YI72	45.6656534	-89.4249666	Present in 2018
YI73	45.6656534	-89.4251704	Present in 2018
YI74	45.6656235	-89.4255352	Present in 2018
YI75	45.6656684	-89.4261789	Present in 2018
YI76	45.6666057	-89.4265866	Present in 2018
YI77	45.6687349	-89.4289523	Present in 2018
YI78	45.6678278	-89.429875	Not Present 2018
YI79	45.6663095	-89.4311839	Not Present 2018
YI80	45.6662758	-89.4310766	Not Present 2018
YI81	45.6607122	-89.4344509	Present in 2018
YI82	45.6606597	-89.4343007	Present in 2018
YI83	45.6605172	-89.4339037	Present in 2018
YI84	45.6606447	-89.4335282	Present in 2018
YI85	45.6597524	-89.4323695	Present in 2018
YI86	45.6585451	-89.4301915	Present in 2018
YI87	45.6582751	-89.4297945	Present in 2018
YI88	45.6573678	-89.4306099	Present in 2018
YI89	45.6574803	-89.4315648	Present in 2018
YI90	45.6537382	-89.4336462	Present in 2018
YI91	45.6535882	-89.4334424	Present in 2018
YI92	45.6534907	-89.43326	Present in 2018
YI93	45.6534682	-89.4328201	Present in 2018
YI94	45.6529508	-89.4318008	Present in 2018
YI95	45.6529133	-89.431715	Present in 2018
YI96	45.6528383	-89.4296658	Present in 2018

YI97	45.6520733	-89.4280457	Present in 2018
YI98	45.6520733	-89.4277024	Present in 2018
YI99	45.6516533	-89.4274664	Present in 2018
YI100	45.6574278	-89.4001722	Present in 2018
YI101	45.6581477	-89.3996572	Present in 2018
YI102	45.6585076	-89.3991852	Present in 2018
YI103	45.6598574	-89.3963528	Not Present 2018
YI104	45.6604572	-89.3961382	Not Present 2018
YI105	45.661477	-89.3968678	Not Present 2018
YI106	45.6624968	-89.3975115	Not Present 2018
YI107	45.6625868	-89.3963099	Present in 2018
YI108	45.6632466	-89.3918252	Present in 2018
YI109	45.6638464	-89.3839288	Present in 2018
YI110	45.6636815	-89.3836069	Present in 2018
YI111	45.6663807	-89.3812466	Present in 2018
YI112	45.6678053	-89.3826413	Present in 2018
YI113	45.6678503	-89.3833494	Present in 2018
YI114	45.6684201	-89.3866539	Present in 2018
YI115	45.66866	-89.3880057	Present in 2018
YI116	45.6687499	-89.3887353	Present in 2018
YI117	45.668615	-89.3900657	Present in 2018
YI118	45.6730383	-89.4066525	Present in 2018
YI119	45.6730383	-89.4124031	Present in 2018
YI120	45.6728733	-89.4124889	Present in 2018
YI121	45.6690498	-89.4132829	Present in 2018
YI122	45.6680902	-89.4113088	Present in 2018
YI123	45.6674604	-89.4067383	Present in 2018
YI124	45.6674304	-89.4056439	Present in 2018

YI125	45.6670405	-89.4056225	Present in 2018
YI126	45.6669955	-89.4056225	Present in 2018
YI127	45.6674454	-89.3987346	Present in 2018
YI128	45.6675953	-89.3976831	Present in 2018
YI129	45.6678503	-89.3978977	Present in 2018
YI130	45.6679102	-89.3962884	Present in 2018
YI131	45.6674154	-89.3905377	Present in 2018
YI132	45.6674604	-89.3903661	Present in 2018
YI133	45.6674154	-89.3895292	Present in 2018
YI134	45.6677753	-89.3878984	Present in 2018
YI135	45.6679252	-89.3877268	Present in 2018
YI136	45.6665607	-89.3863106	Present in 2018
YI137	45.6665157	-89.3866324	Present in 2018
YI138	45.6661858	-89.3917823	Present in 2018
YI139	45.6661408	-89.3917823	Present in 2018
YI140	45.665601	-89.3930054	Present in 2018
YI141	45.665586	-89.394207	Present in 2018
YI142	45.6652111	-89.3963742	Present in 2018
YI143	45.6651811	-89.3965888	Present in 2018
YI144	45.6651811	-89.3966746	Present in 2018
YI145	45.6647162	-89.398241	Present in 2018
YI146	45.6624593	-89.4009608	Present in 2018
YI147	45.6623018	-89.4010037	Present in 2018
YI148	45.6617132	-89.4020927	Present in 2018
YI149	45.6595537	-89.4023877	Present in 2018
YI150	45.6595087	-89.4022858	Present in 2018
YI151	45.6593437	-89.4019908	Present in 2018
YI152	45.6589575	-89.4012451	Present in 2018

YI153	45.6586051	-89.40139	Present in 2018
YI154	45.6585563	-89.4014168	Present in 2018
YI155	45.658382	-89.4014919	Present in 2018
YI156	45.6579752	-89.4016716	Present in 2018

Figure 8: Mapped location of Yellow



**GPS locations of Yellow Iris within project boundaries.

5.7 Chinese mystery snail

Chinese mystery snails were observed throughout the project boundaries in 2018 and were known to be present previously. The largest populations observed were up river locations adjacent to the wild rice fields.

5.8 Rusty crayfish

Rusty crayfish were observed throughout the project boundaries in 2018 and were known to be present previously.

5.9 Eurasian water-milfoil

Eurasian water-milfoil was not observed during any surveys in 2018 and has never been detected within the project boundaries

5.10 Watercraft inspections

Inspections were completed from June 1, 2018 to August 31, 2018. The inspections were completed using the watercraft inspection report form 3200-120 (Appendix 5). Inspection days focused on Friday, Saturday and Sunday to maximize the amount of boater contacts. Inspection locations were chosen based on the highest amount of traffic. Hodag Park boat landing was the primary location, and the boat launch off of Apperson Drive in the town of McNaughton was a secondary location. A total of 97 hours was logged resulting in 309 people contacted and 141 watercrafts inspected. 70 hours were spent at Hodag Park and 27 hours off of Apperson Drive. During inspections, there were zero noncompliance issues, all people contacted seemed eager to participate and were given up-to-date AIS information.

5.11 Phragmites

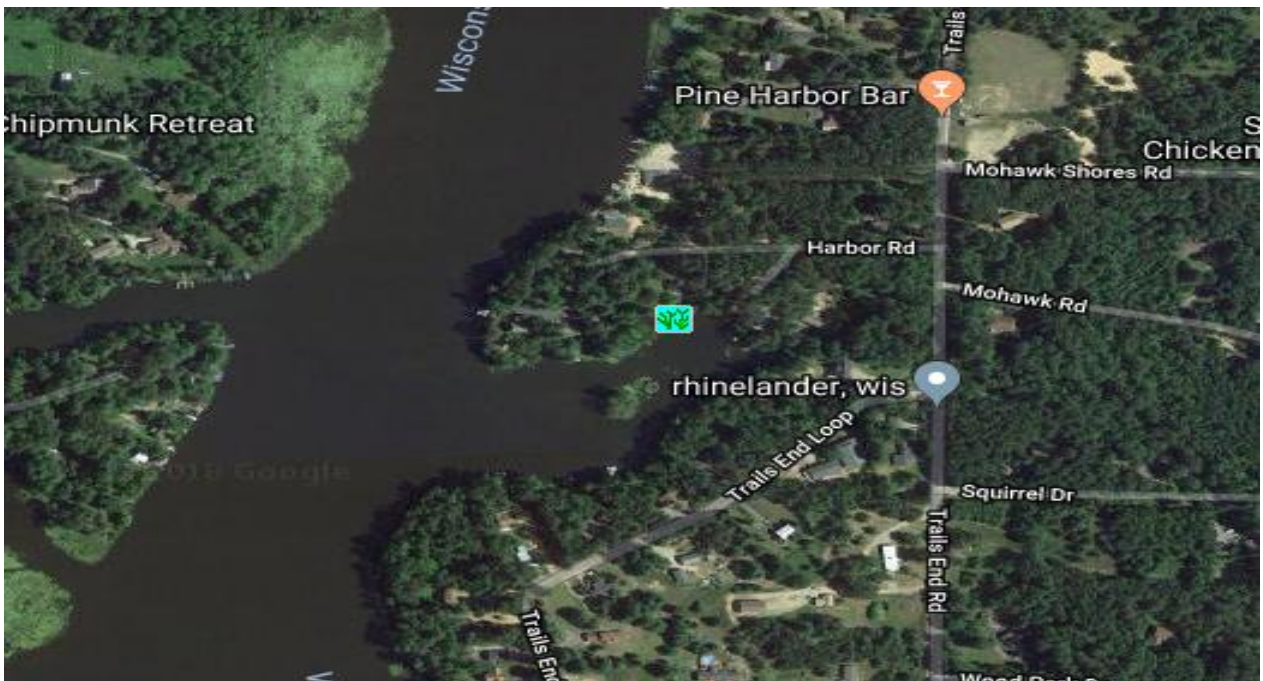
A location within the project boundaries was observed to contain a Phragmites population. This population has been noted and measured for the last five years while the survey was preformed. Questions of the species showing both signs of a native population and signs of the non native

strain arose from a property owner where the stand is found. Samples were taken and sent to University of Wisconsin Whitewater for genetic testing. Results pending.

Figure 9: Phragmites map location



***Location of Phragmites stand. Lat. 45.65853, Long. -89.44273



8.0 Mapping Tools

The maps were created using the website *GPSVisualizer.com*. This is an online utility that creates maps from various forms of GPS data. The GPS points taken throughout the survey were uploaded to generate the maps in this report.

9.0 Literature cited

IMFWisconsin, *History of the Rhineland Chain*, Uncategorized.

Rhineland. Web. Feb 2013

McFarland, Erin, *Watercraft Inspector Handbook*, Wisconsin Lakes Partnership, 2012.

Andrew, M. Lloyd and Threinen, C.W., *Surface Water Resources of Oneida County*, Lakes and Streams Classification Project, Madison Wisconsin, 1966.

Appendix 1. Order amending invasive species management plan

135 FERC ¶ 62,132
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Wausau Paper Specialty Products, LLC

Project No. 2161-019

ORDER AMENDING INVASIVE SPECIES MANAGEMENT
PLAN PURSUANT TO ARTICLE 406

(Issued May 11, 2011)

1. On February 10, 2011, Wausau Paper Specialty Products, LLC (licensee), filed a request to amend the invasive species management plan for the Rhinelander Hydroelectric Project (FERC No. 2161), pursuant to article 406 of the project license.¹ The project is located on the upper Wisconsin River in Tomahawk, Newbold, Pine Lake, and Pelican townships, Oneida County, Wisconsin.

BACKGROUND

2. Article 406 requires the licensee,² after consultation with the Wisconsin Department of Natural Resources (Wisconsin DNR) and the U.S. Fish and Wildlife Service (FWS), to file an exotic species control plan to monitor invasive species, such as purple loosestrife (*Lythrum salicaria*) and Eurasian water milfoil (*Myriophyllum spicatum*), at the project. The approved invasive species management plan, as modified, requires the licensee to conduct annual surveys for invasive plants, especially purple loosestrife and Eurasian water milfoil, in project lands and waters, for at least five consecutive years.³ The approved invasive species management plan requires the licensee to file annual monitoring reports with the Wisconsin DNR and FWS for review, and to file the annual monitoring reports, with any resource agency comments and recommendations, with the Federal Energy Regulatory Commission (Commission). The

¹ Order Issuing New License issued August 20, 2003 (104 FERC ¶ 62,134).

² On December 28, 2006, the Commission issued an Order Approving Transfer of License from Rhinelander Paper Company to Wausau Paper Specialty Products. *See* (117 FERC ¶ 62,270).

³ Order Modifying And Approving Invasive Species Management Plan Pursuant To Article 406 issued April 27, 2006 (115 FERC ¶ 62,106).

licensee filed the five annual monitoring reports with the Wisconsin DNR and FWS, and subsequently with the Commission, in a timely manner.

3. The approved invasive species management plan requires that the fifth monitoring report be a comprehensive report containing a comparison of all data collected in the previous five years. Further, it states that if, after five consecutive years, there appears to be either no invasive plant species present or no spread of existing invasive plants, then the licensee may propose an alternative monitoring and reporting frequency, after consulting with the resource agencies.

4. The licensee filed its fifth monitoring report on December 10, 2010, which documented the survey of project lands and waters for invasive species for 2010. The licensee filed its comprehensive summary report separately on February 10, 2011, along with its request to amend the plan.

LICENSEE'S SUMMARY REPORT

5. In 2006, a baseline meander survey for purple loosestrife and Eurasian water milfoil was conducted for the project. Annual surveys were conducted in 2007, 2008, 2009, and 2010. During all of the surveys, no Eurasian water milfoil was found. In addition, point intercept surveys for Eurasian water milfoil were performed concurrently with the meander surveys, in all survey years at the project, and no Eurasian water milfoil was found.

6. In all survey years, purple loosestrife was found within the limits of the project, both upstream and downstream of the project dam. The total number of occurrences and plants has remained relatively low during the five years of surveys:

- 2006 - one occurrence (16 plants) located in the upstream (impoundment) and eight occurrences (28 plants) downstream (bypass reach and tailrace) of the dam (total = 44 plants)
- 2007 - two occurrences (14 plants) located in the upstream and five occurrences (25 plants) downstream of the dam (total = 39 plants)
- 2008 - two occurrences (12 plants) located in the upstream and nine occurrences (40 plants) downstream of the dam (total = 52 plants)
- 2009 - five occurrences (20 plants) located in the upstream and four occurrences (28 plants) downstream of the dam (total = 48 plants)
- 2010 - nine occurrences (35 plants) located in the upstream and eight occurrences (23 plants) downstream of the dam (total = 58 plants).

7. Overall, the number of purple loosestrife plants observed downstream of the dam has remained about the same while those upstream of the dam have shown an increase. The licensee cites the use of the *Galerucella* beetle as a biological control and the ability of the survey crew to remove the seed heads or to pull many of the plants from licensee-owned and/or publicly-accessible lands downstream of the dam. The licensee cites the absence of the *Galerucella* beetle and the difficulty in obtaining permission from land owners to enter their property to remove the plants upstream of the dam.

LICENSEE'S PROPOSED AMENDMENT

8. The licensee proposes, after consultation with the Wisconsin DNR, to provide funding to the Wisconsin DNR to hire a seasonal summer employee from mid-May through August. This person will be directed by the Wisconsin DNR and their duties would be focused both on control and monitoring of purple loosestrife in the project area. The licensee proposes that the seasonal employee's activities would include:

- watercraft inspections
- Aquatic Invasive Species (AIS) monitoring (Eurasian water milfoil, curly leaf pond weed, purple loosestrife, spiny water-flea, zebra mussels, and possibly others)
- public education and involvement
- updating signage as needed
- aquatic plant surveys
- AIS and aquatic plant mapping
- AIS removal
- train volunteers on watercraft inspection and citizen volunteering monitoring activities
- other AIS related activities as needed.

9. The licensee proposes to fund this position for a period of five years. At the end of the five-year period, the licensee proposes, in consultation with the resource agencies, to review the effectiveness of this procedure in the control of purple loosestrife and other invasive species. The licensee states that the funding of the AIS person would be a valuable contribution in the control of invasive species, and that the funding would provide a more effective and coordinated use of funds to enhance the quality of the project area.

licensee filed the five annual monitoring reports with the Wisconsin DNR and FWS, and subsequently with the Commission, in a timely manner.

3. The approved invasive species management plan requires that the fifth monitoring report be a comprehensive report containing a comparison of all data collected in the previous five years. Further, it states that if, after five consecutive years, there appears to be either no invasive plant species present or no spread of existing invasive plants, then the licensee may propose an alternative monitoring and reporting frequency, after consulting with the resource agencies.

4. The licensee filed its fifth monitoring report on December 10, 2010, which documented the survey of project lands and waters for invasive species for 2010. The licensee filed its comprehensive summary report separately on February 10, 2011, along with its request to amend the plan.

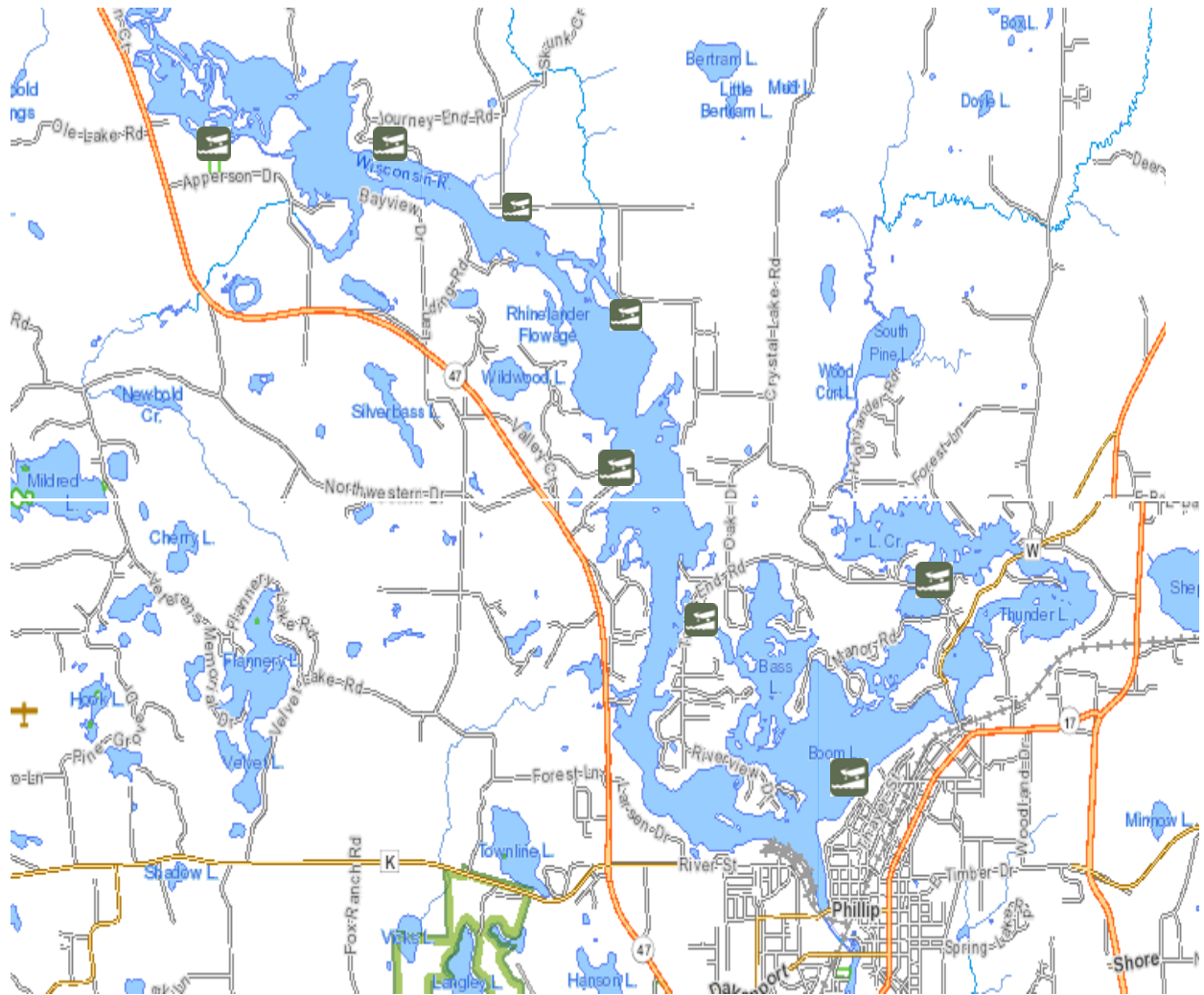
LICENSEE'S SUMMARY REPORT

5. In 2006, a baseline meander survey for purple loosestrife and Eurasian water milfoil was conducted for the project. Annual surveys were conducted in 2007, 2008, 2009, and 2010. During all of the surveys, no Eurasian water milfoil was found. In addition, point intercept surveys for Eurasian water milfoil were performed concurrently with the meander surveys, in all survey years at the project, and no Eurasian water milfoil was found.

6. In all survey years, purple loosestrife was found within the limits of the project, both upstream and downstream of the project dam. The total number of occurrences and plants has remained relatively low during the five years of surveys:

- 2006 - one occurrence (16 plants) located in the upstream (impoundment) and eight occurrences (28 plants) downstream (bypass reach and tailrace) of the dam (total = 44 plants)
- 2007 - two occurrences (14 plants) located in the upstream and five occurrences (25 plants) downstream of the dam (total = 39 plants)
- 2008 - two occurrences (12 plants) located in the upstream and nine occurrences (40 plants) downstream of the dam (total = 52 plants)
- 2009 - five occurrences (20 plants) located in the upstream and four occurrences (28 plants) downstream of the dam (total = 48 plants)
- 2010 - nine occurrences (35 plants) located in the upstream and eight occurrences (23 plants) downstream of the dam (total = 58 plants).

Appendix 2. Rhinelander Flowage boat landings



Appendix 3

Aquatic Invasive Species Early Detection Monitoring in Lakes

State of Wisconsin Department of Natural Resources STANDARD OPERATING PROCEDURES

*Bureau of Water Quality
March 2015*

BACKGROUND

The Wisconsin Department of Natural Resources (DNR) currently relies upon a strong network of volunteers (Citizen Lake Monitoring Network – CLMN), partners (e.g. Wisconsin River Alliance, Great Lakes Indian Fish and Wildlife Commission, University of Wisconsin-Madison, County AIS Staff) and Department staff to monitor lakes and streams for new aquatic invasive species (AIS). This system has been adequate to date but does not enable a statewide assessment of AIS presence/absence or the rate of spread and therefore an evaluation of the effectiveness of the State's AIS message which is aimed at stopping the spread of AIS by targeting transient boaters.

The statewide monitoring strategy outlined below will provide DNR and partners with information to:

1. Establish baseline data on statewide AIS distribution.
2. Track the rate of AIS spread in a number of vulnerable waterbodies that will represent the state as a whole.
3. Evaluate the effectiveness of outreach and education efforts aimed at stopping the spread of AIS.

In addition to these three priority objectives this monitoring strategy may trigger statewide, regional or local implementation of a rapid response strategy, lead to an assessment of abundance and frequency within a waterbody and/or an evaluation of management activities. These secondary monitoring activities will depend on staff and funding availability and will likely be funded through competitive projects and AIS or other grants or by DNR partners.

To have a statistically valid assessment of AIS spread in the state's lakes the DNR is monitoring 200 randomly selected lakes per year over a 5 year period. At the end of the five years the Department will be able to say with statistical validity what the rate of AIS spread is within the state and whether that rate of spread increased or decreased by as little as 3% annually or if it stayed the same.

Monitoring will be conducted by WDNR staff, partners, and volunteers. The statewide AIS monitoring coordinator (Ferry) will develop monitoring protocols and coordinate monitoring efforts. The three Great Lakes Basin AIS Specialist's (Bates, Nault, and Plude) are specifically hired to conduct monitoring and response in counties that touch the Great Lakes Basin. Regional DNR AIS coordinators and staff will

implement monitoring in non-Great Lakes basin counties (NORc-Hansen/Kreitlow, NORr-Gauthier, NORs-Toshner/Smith, SCR-Graham and WCRProvost/Lepsch). The Great Lakes Indian Fish and Wildlife Commission, county AIS staff and Citizen Lake Monitoring volunteers will help where appropriate.

FIELD PREPARATION



Field
Preparation.docx

TARGET SPECIES

Table 1. Species targeted for aquatic invasive species surveys. Species with an asterisk (*) are used for statistical analysis to track the rate of spread.

Common Name	Latin Name	Species Code
Aquatic Plants		
European Frog-bit	<i>Hydrocharis morus-ranae</i>	EFB
Yellow Floating Heart	<i>Nymphoides peltata</i>	YFH
Water Chestnut	<i>Trapa natans</i>	WC
Brazilian Waterweed	<i>Egeria densa</i>	BWW
Hydrilla	<i>Hydrilla verticillata</i>	HYD
Curly-Leaf Pondweed*	<i>Potamogeton crispus</i>	CLP
Fanwort	<i>Camboba caroliniana</i>	FW
Parrot Feather	<i>Myriophyllum aquaticum</i>	PF
Eurasian Water Milfoil*	<i>Myriophyllum spicatum</i>	EWM
Water Hyacinth	<i>Eichhornia crassipes</i> and <i>E. azurea</i>	WH
Water Lettuce	<i>Pistia stratiotes</i>	WL
Didymo	<i>Didymosphenia geminata</i>	DIDY
Wetland Plants		
Flowering Rush*	<i>Butomus umbellatus</i>	FR
Phragmites*	<i>Phragmites australis</i>	PHRG
Japanese Knotweed	<i>Polygonum cuspidatum</i>	JK
Giant Knotweed	<i>Polygonum sachalinense</i>	GK
Purple Loosestrife*	<i>Lythrum salicaria</i>	PL
Japanese Hop	<i>Humulus japonicus</i>	JH
Yellow Iris	<i>Iris pseudoacorus</i>	YI
Invertebrates		
Zebra Mussels*	<i>Dreissena polymorpha</i>	ZM
Quagga Mussels*	<i>Dreissena bugensis</i>	QM
Asian Clam	<i>Corbicula fluminea</i>	AC

Faucet Snails	<i>Bithynia tentaculata</i>	FS
Spiny Waterfleas	<i>Bythotrephes longimanus</i>	SWF
Chinese Mystery Snails*	<i>Cipangopalundina chinensis</i>	CMS
Banded mystery Snails*	<i>Viviparus georgianus</i>	BMS
New Zealand Mudsnailed	<i>Potamopyrgus antipodarum</i>	NZMS
Red Swamp Crayfish	<i>Procambarus clarkii</i>	RSC
Rusty Crayfish	<i>Orconectes rusticus</i>	RC

*Used in statistical analysis.

For guidance on target species identification and habitat preference, please review the attached and the following websites:



AIS identification
guide.docx



Stream_RiversGuide

_NONPRINT VERSION

- DNR website:
<http://dnr.wi.gov/topic/Invasives/species.asp?filterBy=Aquatic&filterVal=Y;>
- Aquatic Invasive Species Monitoring section of the Citizen Lake Monitoring Network Manual:
<http://www4.uwsp.edu/cnr/uwexplakes/clmn/publications.asp>.
- [Field guide to Wisconsin Streams](#)
- University of Wisconsin – La Crosse freshwater snail key:
<http://www.uwlax.edu/biology/faculty/perez/wifwsnailkey/wifwsnailkey.htm>.

SAMPLING PERIOD

Sampling will be completed from June 15 through September 15 of each year.

FIELD METHODS

Data Collection

Report data on the AIS Early Detection Monitoring form, zebra mussel veliger tow form, and waterflea tow report form.

<http://dnr.wi.gov/lakes/forms/3200-135-veliger.pdf> <http://dnr.wi.gov/lakes/forms/3200-128-waterflea.pdf>



EarlyDetectionForm_
v2015.pdf

Voucher Collection Protocol

- Collect specimens of **all observed** invasive plants, invertebrates, and didymo for verification and QAQC purposes.
 - Collect up to 5 intact specimens of plants from each lake. Place aquatic plants in a ziplock bag with a small amount of water and riparian/wetland plants in a bag with a wet paper towel. Try to get the root system, all leaves as well as seed heads and flowers when present.
 - Collect up to 20 individuals of Dreissenids and store in a sample bottle or Ziploc bag.
 - Collect up to 3 of other invertebrate species observed.
- While in the boat, store specimens in separate sample bottles or in Ziploc bags with water or a wet paper towel.
- Upon completion of the survey, specimens should be properly preserved. Plants should be vouchered once per week and animals should be preserved daily.
- See *Vouchering Preparation and Shipping* section below for appropriate vouchering protocols for each type of species and the location to send specimen.
- Record data on the Early Detection Form.

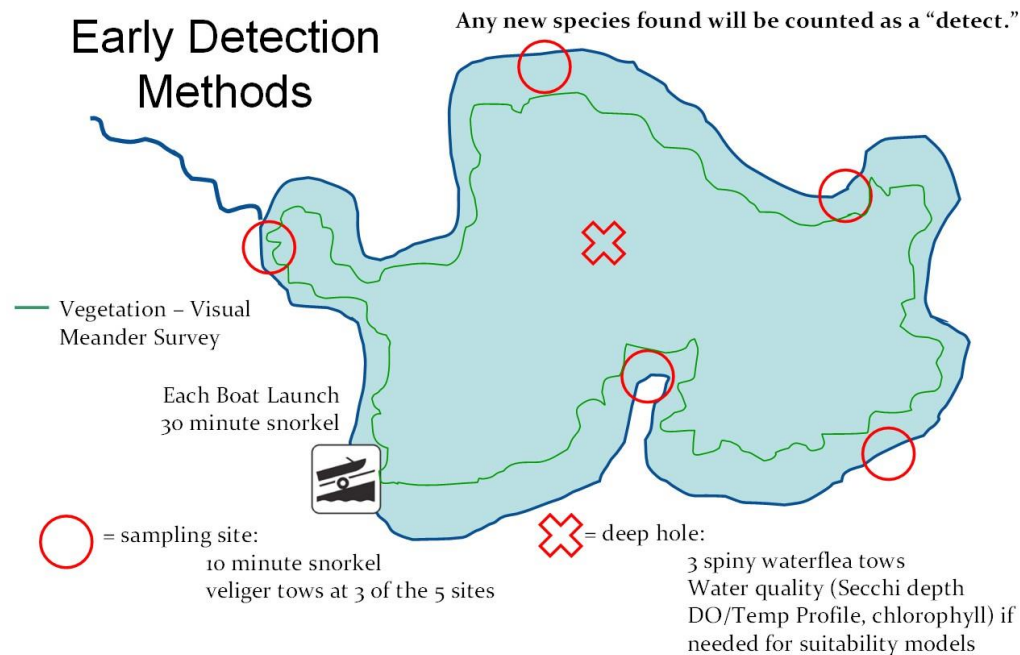


Figure 1. Schematic of AIS Early Detection Survey Design (Latzka and Van Egeren 2010). This map does not accurately illustrate tows and has additional water quality information that is not collected during these surveys.

Boat Landing Search(es)

- Survey all public boat landings (public and commercial). Do not include small, backyard boat ramps. Record the location of each boat landing from the shoreline in decimal degrees using a GPS (datum WGS84) whether or not any AIS are found.
- Each landing is searched for 30 minutes using snorkeling, D-nets, rakes, and surveying shoreline. Snorkel for 15 minutes covering an area of shoreline 200' long out to the maximum depth of plant growth or 100' from shore. For distance reference, baseball bases are 90' apart and a football field is 300' long. Spend 15 minutes using the D-net and rake in the shallow water and also examining the shoreline for 200'.
- For QAQC purposes, collect specimens of all AIS recorded.
- If there is poor visibility or safety is a concern (e.g. blue-green algae bloom), do not snorkel. Instead, analyze rake tows and D-net samples for about 30 minutes within the defined area (200' shoreline and 100' from shore). □ Record data on Early Detection form.

Water Quality

- From deep hole record the secchi disk depth reading (preferably between 10 am and 4 pm) and conductivity on the Early Detection form.

Waterflea Tows

- Collect 3 oblique waterfleas tows using a ~250 micron mesh net from the deep hole according to the Water Flea Monitoring Protocol:

http://dnr.wi.gov/lakes/forms/protocols/SpinyWaterflea_MonitoringProtocol.pdf.

- In shallow lakes, it is difficult to collect oblique tows. If possible, collect 3 horizontal tows. If the water is too shallow with dense macrophytes, attempt collecting 3 vertical tows, but avoid collecting macrophytes. Indicate on the data sheet comments if you could not collect a waterflea tow.
- Rinse samples into the sample bottle and decant as much water as possible. See the Voucher Preservation and Shipping section for instructions on preservation and labelling.
- Record data on Early Detection Form and also the Water Flea Tow Monitoring Report form 3200-128: <http://dnr.wi.gov/lakes/forms/3200-128-waterflea.pdf>.

Veliger Tows

Review the Dreissenid (Zebra and Quagga) Mussel Monitoring Protocol to gain background sampling information:

http://dnr.wi.gov/lakes/forms/protocols/ZebraMussel_MonitoringProtocol.pdf.

Revised Veliger Tow Protocols

- Variations from the established Dreissenid (Zebra and Quagga) Mussel Monitoring Protocol include using conductivity to determine whether veliger tows are conducted and also locations and depths within lakes to be sampled.
- Lakes with a conductivity of 99 umhos/cm or greater must be sampled for veligers. Historical conductivity records for some lakes are included in the lake list spreadsheet.
- Collect 3 vertical zebra mussel veliger net tows (using the 64 micron mesh net); one from the deep hole and 2 other tows from deep areas along the downwind side of the lake.
- Veligers are plankton and will move with the wind so sample deep, downwind portions of a lake. In lakes that stratify, veligers will be in higher abundance above the thermocline so samples should be collected slightly deeper than the established protocol indicates. Since most staff do not have dissolved oxygen probes to determine the depth of stratification, we have included estimates for sampling depth below.
- The depth of the veliger tow will depend on the depth of the water using the following criteria:
 - 1) if water column is **deeper than 6 meters** (~19.7 feet), then collect each tow with the ring of the net **4 meters** (~13.1feet) from the surface; or
 - 2) if the water column is **shallower than 6 meters** (~19.7 feet), attempt to collect a vertical tow with the ring of the net within **2 meters** of the bottom.
- The net must be lowered slowly to not disturb the bottom sediments and get sediment in the net. Rinse samples into the sample bottle and decant as much water as possible. □ Record data

on Early Detection Form and the Mussel Veliger Tow Monitoring Report (<http://dnr.wi.gov/lakes/forms/3200-135-veliger.pdf>). See Voucher Preservation and Shipping for instructions on preservation and labelling.

Targeted Search Sites

- Stop at each targeted search site and conduct 10 minute snorkel searches. If there are two people, one person should snorkel for 5 minutes while the other person examines the shallows and shoreline for 5 minutes (while also keeping watch on the snorkeler). If you find additional appropriate search sites during the shoreline meander, you can add additional 10 minute searches or replace the sites that you pre-selected.
- For QAQC purposes, collect specimens of all AIS recorded.
- If there is poor visibility or safety is a concern (e.g. blue-green algae bloom), do not snorkel. Instead, at each site analyze rake tows and D-net samples for about 10 minutes.
- Record the site number and location (center of site at shoreline in decimal degrees) of each site on the datasheet whether or not any AIS are found. Record the name of any species found and density rating (as defined on the datasheet). Record data on Early Detection Form.

Meander Survey

- During the meander survey, drive boat slowly between target sites and look for aquatic invasive plants, mussels, and snails in the water and along the shoreline. Meander between shallow water and maximum rooting depth or 100' from shore whichever comes first.
- If not snorkeling the target sites due to poor visibility or safety concerns, visibility will likely be difficult during the meander survey also. To sample during the meander survey in low visibility, collect 50 rake tows/D-net samples during the meander survey.
- Record the site number, location in decimal degrees and the name and density (as defined on the back of the datasheet) of each AIS occurrence observed. However, only collect separate GPS points from discretely different beds or populations of invasive species.
- If three discrete locations of a certain species are found either at targeted search sites and/or during the meander survey stop recording new locations during the meander survey. Three discrete locations of one species will indicate that the species is established in the lake.
- Collect specimens of all AIS reported for QAQC purposes.
- Record data on Early Detection Form.

FOLLOWING FIELD PROTOCOL

Equipment Disinfection



Equipment
Disinfection.docx

Notification

- If AIS not previously observed in a waterbody are found, follow the Department's communication protocol:
<http://dnr.wi.gov/lakes/invasives/AISDiscoveryCommunicationProtocol.pdf>.
- To expedite verification of a prohibited species or pioneer population, notify the regional DNR AIS Coordinator, Maureen, Amanda, and the appropriate taxonomic expert to request immediate verification.

Send weekly updates with what lakes have been surveyed and which AIS were observed in each lake to:

- DNR Central Office AIS Staff: Maureen.Ferry@wisconsin.gov and Amadan.Perdzock@wisconsin.gov
- Regional DNR Lake Coordinator
- Regional DNR Fish Biologist
- External partners (County, Great Lakes Indian Fish and Wildlife Commission)
- CLMN volunteer and lake association (confirm whether monitoring staff or the Lake Coordinator should inform the lake group) Other?

Data Entry

- Enter Early Detection form data into SWIMS once each week in the "Aquatic Invasive Species Early Detection Surveys 2015" project.
- Contact Maureen Ferry if you have questions about SWIMS data entry.

Voucher Preparation and Verification

Macrophytes

- The following contains guidance on pressing plants and preparing plant vouchers:
 - Pressing plants guidance can be found in p. 25-26 in the aquatic plant monitoring protocol: <http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/Aquatic%20Plants/PI-Protocol-2010.pdf>.
 - Voucher preparation:
<https://www.uwgb.edu/biodiversity/herbarium/voucher02.htm>
 - Background on label information to include on herbarium voucher labels:
<https://www.uwgb.edu/biodiversity/herbarium/herbariumLabel01.htm>.
 - Acid-free herbarium paper is mandatory for vouchers.
 - For the Freckmann Herbarium, complete the attached voucher label on acid-free herbarium paper. Paperclip the label to the herbarium paper with the vouchered plant.
 - For the Wisconsin State Herbarium, complete the attached spreadsheet and paper clip a temporary label to the herbarium paper with the vouchered plant.
- Coordinate with regional staff to compile all plant vouchers.
- Each region should create a list of vouchers.

- Schedule an appointment with the herbarium for verification and vouchering.
- Have herbarium verify the vouchers by checking off the list of vouchers.
- Update SWIMS, as needed.
- Make a copy of the verified list and send to central office to attach to the updated SWIMS record. ○ The verification list must be mailed or emailed to Maureen.Ferry@wisconsin.gov and Jennifer.Filbert@wisconsin.gov.



Freckmann voucher UW Madison voucher labels.docx
list.xlsx

Dr. Robert Freckmann

Robert Freckmann Herbarium

800 Reserve Street

TNR 304

Stevens Point, WI 54481

rfreckma@uwsp.edu 715-346-4248

Mark Allen Wetter

Collections Manager/Senior Academic Curator

Wisconsin State Herbarium (WIS)

Department of Botany 430 Lincoln

Dr.

University of Wisconsin-Madison Madison,

WI 53706 mawetter@wisc.edu 608-262-

5109/262-2792

Snails, spiny water flea, zebra mussel veligers, and other invertebrates

- Preserve with 95% ethanol in a ratio of 4 parts ethanol and 1 part sample.
- If space allows, place all samples of the same type in the same jar and for spiny water flea and zebra mussel veliger tows, record “Y” that samples have been consolidated on the Early Detection Form. If needed, split the sample into two (or more) sample bottles and label as “1 of 2” and “2 of 2”.
- **Please add sufficient ethanol** - samples without enough ethanol will smell bad.
- Include internal and external labels on all samples.

- Internal labels can be on Rite in the Rain paper with a #2 pencil. ○ External labels can be on Rite in the Rain paper or a heavy card stock with a #2 pencil.
- Do not use sharpies, pen or wax pencils - ethanol used to preserve the samples will wash the label off.
- Label sample jar with WBIC, lake name, county, sample date, sample type (snails, spiny water flea or zebra mussel) and collector.
- Legibility is appreciated.



Blank Labels.docx

- For snail specimens, please complete the attached “Snail collection” excel spreadsheet and email to gsandland@uwlax.edu and Maureen.ferry@wisconsin.gov.



Snail collection.xlsx

- Staff shipping samples that are preserved in ethanol MUST complete hazardous shipping training (<http://intranet.dnr.state.wi.us/int/es/science/ls/Shipping/Training/>).
- Samples shipped in ethanol should be enclosed in a Ziploc bag and stored vertically to prevent leakage.
- Place bottles in Ziploc facing same direction so that labels can be easily read when box is opened and bag is lifted.
- Samples that contain ethanol must attach a label identifying the appropriate ethanol label.



Ethanol labes.docx

- Ship samples in a Styrofoam insert to protect contents (<http://www.thermosafe.com/>).
 - If you want shipping containers returned after samples are analyzed, please complete the flip card return label (Ziploc envelope) that is supplied with the container. DNR Science Service Operations may use an existing account to return containers.
 - We do not have a shipping contract set up with UW La Crosse yet, so if you want your shipping containers returned, include a note for them to hold your container and DNR central office staff can pick them up.
- Ship the samples via SpeeDee, FedEx, Dunham or USPS.
- Hand delivery is nice, but can be an unnecessary hassle.



Shipping EtOH.pdf



USPS ethanol.pdf

- Be sure all bottles are labeled properly. Include a copy of the datasheets.
- Send samples to DNR Science Service and UW La Crosse each month.
- **Do not wait** to send samples until the end of summer as this increases work for the verifiers.

Send spiny water flea and zebra mussel samples to:

Paul Garrison

Wisconsin Dept. of Natural Resources Science Service Operations

2801 Progress Road

Madison, WI 53716

Send snail specimens to:

Greg Sandland

Biology Department

855 East Ave North

University of Wisconsin-La Crosse,

La Crosse, WI 54601

APPENDIX 3A

AIS Early Detection Monitoring Equipment List

All lakes

- ___ 54 µm plankton net (veliger samples)
- ___ 243 µm plankton net (waterflea samples)
- ___ Mesh bag (nylons or fruit mesh bags can be used) – to place specimens in underwater.
- ___ Ziploc bags for plant preservation (can be reused)
- ___ Waterproof paper (to print monitoring forms and specimen labels on)
- ___ Plastic bottles for benthic invertebrate specimens and plankton samples (~3 per lake)
- ___ Bottle labels ~ available from Maureen Ferry or Erin Vennie-Vollrath
- ___ Ethanol (95%) for veliger, waterflea, snail and mussel preservation
- ___ Squirt bottle(s) filled with ethanol or deionized water (for plankton samples)
- ___ GPS
- ___ Bathymetric map of lake
- ___ Plant press and herbarium paper
- ___ Depth finder (in boat or handheld)
- ___ Jonboat and/or canoe
- ___ Sorting trays for plants and inverts
- ___ Polarized sunglasses
- ___ Boat ladder (for easily exiting and entering the boat in deep water)
- ___ Tubs for equipment disinfection
- ___ Snorkel mask clearing solution
- ___ Sonde or Hydrolab (to measure conductivity)
- ___ Secchi disk
- ___ Backpack sprayer and bleach solution (for decontamination)
- ___ Shipping container <http://www.thermosafe.com/>

Turbid lakes

- ___ D-net
- ___ Aquatic plant rake ~ (detailed instructions in [aquatic plant monitoring protocol](#))
- ___ Latex or other gloves to protect hands from blue-green algae.

Clear lakes

- ___ Wetsuits
- ___ Snorkel, mask, fins and weightbelt
- ___ Diveflag, float and anchor
- ___ Stopwatch

50 meander sites - 10 rake throws and 10 D-net samples during meander survey between sampling sites for a total of 50 meander survey sites

† If lake/site was not snorkeled, indicate why: stained water, turbid water, blue-green bloom, chemical treatment, other (please describe).

‡ Density Ratings

1 – A few plants or invertebrates

4 – Dense plant, snail or mussel growth in a whole bay or portion of the lake

2 – One or a few plant beds or colonies of invertebrates

5 – Dense plant, snail or mussel growth covering most shallow areas

3 – Many small beds or scattered plants or colonies of invertebrates

Step 2: Collect Waterflea Tows from 3 sites: the deep hole (DH) and 2 other sites in water deeper than 15 feet (if possible). Submit sample and Water Flea Tow Monitoring Report form to Science Services.

Site	Depth sampled	Method (hor, obliq, vert)	Net diameter (30 or 50 cm)	Ethanol added (Y or N)	Samples combined (Y or N)	Sample sent to, date

Step 3: Collect Veliger Tows from 3 sites; the deep hole (DH), outlet site (OS), and or downwind site (DS) in water depth of about 4 meters (if possible). Submit sample and Mussel Veliger Tow Monitoring Report form to Science Service.

Site	Depth sampled	Net diameter (30 or 50 cm)	Ethanol added (Y or N)	Samples combined (Y or N)	Sample sent to, date

Step 4: Were plant voucher specimens submitted? Yes No (circle) If yes, where? (circle) Freckmann Herbarium, Other _____

Step 5: Were snail voucher specimens submitted (separate into Chinese, banded, all others)? Yes No (circle) If yes, where? (circle) UW La Crosse or Other _____

Step 6: Data was entered into SWIMS on _____ by _____

Step 7: Data was proofed on _____ by _____

Notes:

APPENDIX 3C (pre 2017)

State of Wisconsin
 Department of Natural Resources
 Wisconsin Lakes Partnership

Water Flea Tow Monitoring Report
 Form 3200-128 (R 02/10)

The purpose of this form is to track the presence/absence of spiny or fishhook water fleas collected using a plankton net during AIS monitoring.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector			
Name	Phone Number	Email	
Monitoring Location			
Waterbody Name	WBIC	County	Township Name
Date and Time of Monitoring			
Start Date	Start Time	End Date (= Start Date)	End Time
Monitoring Results			
Method used: <input type="checkbox"/> horizontal tows (near surface) <input type="checkbox"/> oblique tows (thermocline to surface) <input type="checkbox"/> vertical tows (bottom to surface)			
Diameter of plankton net opening 30cm 50cm other _____ (circle one)			
Site 1: Latitude (optional): _____	Longitude (optional): _____	<input type="checkbox"/> Preservative Added	
Secchi depth (m) _____ (optional)	Depth sampled (if vertical or oblique tow) _____ ft/m	circle one	
Site 2: Latitude (optional): _____	Longitude (optional): _____	<input type="checkbox"/> Preservative Added	
Secchi depth (m) _____ (optional)	Depth sampled (if vertical or oblique tow) _____ ft/m	circle one	
Site 3: Latitude (optional): _____	Longitude (optional): _____	<input type="checkbox"/> Preservative Added	
Secchi depth (m) _____ (optional)	Depth sampled (if vertical or oblique tow) _____ ft/m	circle one	
<input type="checkbox"/> Have you consolidated all of your samples into one composite bottle?			
<input type="checkbox"/> Have you sent your samples to the DNR Plymouth Service Center?			
During this monitoring trip, did you find what you suspect are Spiny or Fishhook Waterfleas in this waterbody? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Voucher Sample			
If you found Spiny or Fishhook Water fleas, did you collect a voucher specimen and bring it to your local DNR office? If so, which office?			
<input type="checkbox"/> Rhinelander	<input type="checkbox"/> Spooner	<input type="checkbox"/> Green Bay	<input type="checkbox"/> Oshkosh <input type="checkbox"/> Did not take sample to a DNR office
<input type="checkbox"/> Fitchburg	<input type="checkbox"/> Waukesha	<input type="checkbox"/> Eau Claire	<input type="checkbox"/> Superior <input type="checkbox"/> Other Office: _____

If you find Spiny or Fishhook Water Fleas

Please bring a copy of this form, along with a voucher specimen and if possible, a map showing where you found the suspect waterfleas to your regional Citizen Lake Monitoring Coordinator at the DNR. All initial discoveries should be placed in rubbing alcohol until verification by an expert is obtained.

If you don't Find Spiny or Fishhook Water Fleas

If you submit your data online, that is all you need to do. Otherwise, please mail a copy to your regional DNR Citizen Lake Monitoring coordinator. <http://dnr.wi.gov/lakes/contacts>

For DNR staff to fill out	
Volume of sample that was analyzed (ml)	Date analyzed
Name of plankton sample analyst:	
Name of person or museum who identified the voucher specimen	
Was the specimen confirmed as....?	
Spiny Waterflea? <input type="checkbox"/> Yes <input type="checkbox"/> No	Fishhook Waterflea? <input type="checkbox"/> Yes <input type="checkbox"/> No
Have you entered the results of the voucher in SWIMS? <input type="checkbox"/> Yes <input type="checkbox"/> No	
DNR staff: Please enter voucher information for new AIS findings into SWIMS under the Incident Report Project for your county (Choose Incident Report Form in SWIMS). Enter date of sampling for "Start Date", Person who identified specimen as "Data Collector", and Monitoring location as "Station".	

APPENDIX 3D (Pre 2017)

State of Wisconsin
 Department of Natural Resources
 Wisconsin Lakes Partnership

Mussel Veliger Tow Monitoring Report
 Form 3200-135 (R 02/10)

The purpose of this form is to track the presence/absence of zebra or quagga mussel larvae (veligers) collected using a plankton net during AIS surveillance monitoring.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. Personally identifiable information collected on this form will be incorporated into the DNR aquatic invasive species database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector			
Name	Phone Number	Email	
Monitoring Location			
Waterbody Name	WBIC	County	Township Name
Date and Time of Monitoring			
Start Date	Start Time	End Date (= Start Date)	End Time
Monitoring Results			
Guidelines for how many tows to collect: If Secchi depth is >4 m (13 feet) take two 2m deep tows; if Secchi depth is between 2-4 m (6.5-13 feet) take one 2m deep tow; if Secchi depth is <2 m (<6.5 feet) take one 1m tow.			
Diameter of zooplankton net opening 30cm 50cm other _____ (circle one)			
Site 1: Latitude (optional): _____	Longitude (optional): _____	<input type="checkbox"/> Preservative Added	
Secchi depth (m) _____	Number of net tows _____	Depth of tows (m) _____	
Site 2: Latitude (optional): _____	Longitude (optional): _____	<input type="checkbox"/> Preservative Added	
Secchi depth (m) _____	Number of net tows _____	Depth of tows (m) _____	
Site 3: Latitude (optional): _____	Longitude (optional): _____	<input type="checkbox"/> Preservative Added	
Secchi depth (m) _____	Number of net tows _____	Depth of tows (m) _____	
<input type="checkbox"/> Have you consolidated all of your samples into one composite bottle?			
<input type="checkbox"/> Have you sent your samples to the DNR Plymouth Service Center?			
COMMENTS/OBSERVATIONS:			
For DNR staff to fill out			
Volume of sample that was analyzed (ml)		Date analyzed	
Name of plankton sample analyst:			
Name of person or museum who identified the voucher specimen:			
Did the samples contain zebra mussel veligers? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Have you entered the results of the samples in SWIMS? <input type="checkbox"/> Yes <input type="checkbox"/> No			
<i>DNR staff: Please enter voucher information for new AIS findings into SWIMS under the Incident Report Project for your county (Choose Incident Report Form in SWIMS). Enter date of sampling for "Start Date", Person who identified specimen as "Data Collector", and Monitoring location as "Station".</i>			

APPENDIX 3E

<p style="text-align: center;">Flora of Wisconsin</p> <p>Marathon County</p> <p>Haloragaceae</p> <p><i>Myriophyllum tenellum</i> Bigelow</p> <p>Sandy substrate, 0.3-1m deep, with <i>Juncus pelocarpus</i>, <i>Eleocharis acicularis</i>, <i>Eriocaulon aquaticum</i>.</p> <p>Location: Mission Lake</p> <p>Collector: Paul Skawinski</p> <p>22 June 2010</p> <p style="text-align: center;">ROBERT W. FRECKMANN HERBARIUM (UWSP) University of Wisconsin – Stevens Point</p>	

Appendix 4. Watercraft inspection protocol

Watercraft Inspections

Materials to Have When Working at a Boat Landing

Not all your materials need to be taken to the boat landings. It's better to sort through the materials and decide what educational information is best suited for your area. The "Clean Boats, Clean Waters" program provides a plastic container in which to store all the educational materials in the resource kit. We recommend at least one resource kit for every landing you are monitoring. By using multiple resource kits, each inspection team can have all the materials they need and have them protected from the weather.

A key brochure to distribute to all boaters is "Help Stop Aquatic Hitchhikers" (WT-801). This brochure not only has pictures of the different aquatic invasive species, but also describes the prevention steps that boaters need to take every time they leave the water. In addition, the brochure describes Wisconsin's illegal-to-launch law and the penalties that can occur if an invasive species is not removed before the boat is launched. This brochure is a good reminder to all boaters, whether or not they have talked with a watercraft inspector.

Select other materials to take to the boat launch based on which aquatic invasive is most threatening in your area. Perhaps Eurasian water-milfoil is really a pressing issue for your lake; then it makes sense to give boaters an EWM/NWM identification card in addition to the "Help Stop Aquatic Hitchhikers" brochure. Resist the temptation to give the boater one of every card in the resource kit because boaters will often discard them. It's best to start by handing out a little bit of information and have additional brochures available if the boaters want to learn more about a particular invasive species.

Boat landings can be very busy during the summer, and it is expected that you will need more materials. Please refer to the Aquatic Invasive Species Publication List in Section 9 of this handbook. This list explains what publications are available, how to order more publications, and how to print some brochures from Web site links.

Additional boat launch items to consider:

- Clipboard and pencil.
- Copy of the boat landing script (see Section 6).
- Watercraft Inspection Report and Watercraft Check Points List (see Section 7).
- Listing of lakes affected with AIS in your area.
- Wisconsin map.
- Stop Aquatic Hitchhikers decals.
- Selected free AIS publications (see Section 9).
- Plastic bags, permanent marker, and cooler to collect and store any suspect specimens.
- Cell phone and local contact phone numbers for emergencies.
- Digital camera

Watercraft Inspection Tips

Use the following DO and DON'T lists to prepare your boat landing message.

The DO List

- Wear the “Clean Boats, Clean Waters” T-shirt to promote the message. This message gives credibility to the
- Try to approach boat owners before they are on the ramp.
- Always ask if the boater would mind answering a few questions.
- Be polite and courteous to all boaters you encounter.
- Listen to a boater’s concerns. Remember that you are encouraging boaters to take an interest in invasive species.
- Make sure boaters know that they can make a difference!

The DON'T List

- Don't begin asking questions immediately upon approaching boaters, because as they might be confused about who you are and why they should give you their time.
- Avoid delaying boaters too much or causing a backup.
- Never preach to a boater; your mission is to educate, not alienate.
- Do not emphasize the idea that fines are involved, because this approach can make people hostile or defensive.
- If the boater is reluctant to cooperate, hand out educational material and record whatever information you can.

An effective watercraft team is prepared to raise boater awareness and to encourage and demonstrate the necessary steps to avoid spreading invasive species. On very rare occasions, you may be uncomfortable about a situation or person. Always back away from a potentially dangerous or violent situation. Never encourage confrontation, no matter how strongly you might feel about the subject. **Remember, you are not enforcers of rules and should never jeopardize your own safety.** If you are suspicious of someone (for example, a loiterer or someone who is not intending to go boating), do not hesitate to leave the launch site. You are better to be safe than sorry. If you feel that a boat launch site is unsafe in any way, please notify the organization you are working for.

Boat Landing Message

Getting out and speaking to the public can be intimidating. New inspectors can feel a little anxious and nervous. This prepared script will help inspectors practice and role-play before their first boater shows up at the landing. Practicing with other folks will give them the confidence it takes to greet a boater. If new inspectors really want to watch a “pro,” they just need to ask a few kids to get involved. Are kids intimidated? No way!

This prepared script is only one sample of the many methods of addressing boaters at the landings and performing watercraft inspections. Each inspector should develop his or her own style and learn how to adapt in a variety of boat landing experiences. Try to approach boaters before they are on the ramp, and

use the Watercraft Inspection Report form to record the information about the boater (see Section 7). At times you may have only 30 seconds to talk to the boater; other times, long lines at the landings may provide you with lots of time to talk. Remember, if the boater is not interested, just hand out educational material and record whatever information you can.

No matter what style you use to approach boaters, any watercraft inspection process should include these points:

1. Tell them who you are, whom you represent, and why you are there.
2. Ask if they have a short time to answer some questions.
3. Collect information on the Watercraft Inspection Report form.
4. Ask if they are familiar with aquatic invasive species, such as Eurasian water-milfoil or zebra mussels. Briefly explain about these invasive species or other invasives found locally.
5. Ask if they will join you in an inspection of their boat and equipment.
6. Talk while inspecting, and point out watercraft checkpoints. If they do not want to assist you in the inspection, continue to talk about invasive species as you inspect.
7. Give your final message, the prevention steps:

Inspect your boat, trailer and equipment and

Remove any attached aquatic plants, animals, and mud.

Drain all water from your boat, motor, bilge, live well, bait containers, and equipment.

Dispose of unwanted bait in the trash, not in the water or on the land.

Rinse your boat and recreational equipment with hot water OR dry for at least five days.

8. Give them the “Stop Aquatic Hitchhikers” decal and other educational materials.

9. Thank them for their time and cooperation!

Sample Script

As the boat approaches, write down the time of the boat inspection and if the boat is entering or leaving the water.

Introduce yourself:

Good Morning / Afternoon. I am from _____. We are working with state agencies and local groups to talk with boaters about invasive species and help them check their boats for Eurasian water-milfoil (EWM) and zebra mussels (ZM). We are trying to keep EWM/ZM and other harmful exotics from spreading from lake to lake. I have a few quick questions I would like to ask you, and then I would like to walk around your watercraft with you and point out a few places where these species can attach to boats and trailers.

Ask the questions and record on the Watercraft Inspection Report:

1. In the past 30 days, how many times have you been contacted by a watercraft inspector?
2. Was boat used during the past 5 days on a different waterbody? (If the answer is yes) Where?
3. In a typical month of boating, about how many waterbodies do you visit?

4. Last time you went boating, please describe the steps you took when removing your boat from the water. (Mark each step that is mentioned, “Took No Steps” if no steps were taken, or “I Did Not Ask Boater” if this question was not asked.)

5. In 2009, Wisconsin laws were passed that prevent the transport of aquatic plants, animals, and water from one waterbody to another. This includes draining water from containers holding your catch and livewells. Were you aware that this is the law?

(If the answer is no) As of 2009, Wisconsin laws prohibit the transport of plants, animals, or water from a boat landing. Fines for not complying with the rules can be upwards of \$300! I’m just here to share information with you on how to properly clean your boat so that you don’t inadvertently transport aquatic invasive species from one lake to another. However, law enforcement officers will be out enforcing these AIS laws this summer, so I just wanted to let you know about the new rules.

Perform a watercraft check:

If you would walk around your boat with me, I can show you some areas to look for invasive hitchhikers.

Make sure you talk aloud as you inspect; it helps reinforce the “Clean, Boats, Clean Waters” behavior. Talk to boaters about inspecting and cleaning their watercraft and about draining the water from their boat—such as the bilge, bait buckets and live wells—before they leave the access.

Water is another way invasives can move from lake to lake so it is always a good idea to drain your water. Vegetation can be found on motor boats, the motor/prop, anchors, bunks, rollers, the trailer axle, lights/wiring; for jet skis, it can be found in the intake grate and propeller; and for sailboats, it can be found in the centerboards. Check your anchor and anchor line to see if any plants are clinging to it.

Some aquatic invasives, such as zebra mussels, are also found on the motor/prop, on the sides and bottom of boat below the waterline, on the anchor, and clinging to vegetation. It is a good idea to drain water from the motor, live well, bait well, bait bucket, bilge, and transom wells. Always inspect the hull and sides of your boat for aquatic invasives; if it feels gritty or sandy, it may be that new zebra mussels are attached.

An extra precaution that you can take to eliminate other aquatic invasives is to wash your boat with warm tap water or take your boat through a car wash or dry your boat and equipment in the sun for five days before entering another lake.

Leave boaters with a final message: “Clean Boats = Clean Waters”

Please make it a habit to:

Inspect your boat, trailer and equipment and

Remove any attached aquatic plants, animals, and mud.

Drain all water from boats, motors, live wells, bait containers, and equipment.

Dispose of unwanted bait in the trash, not in the water or on the land.

Rinse your boat and recreational equipment with hot water OR dry for at least five days.

Offer boaters the “Stop Aquatic Hitchhikers” brochure and decal and help them place the decal on the handle side of the trailer winch post. Tell them that this decal will let other inspectors know that you have talked to the boater this summer. Remind boaters to follow the precautions listed on the “Stop Aquatic Hitchhikers” decal every time they leave a water body.

Thank the boaters for their time and cooperation!

Potential Scenarios/Questions from Boaters

“Why are you out here wasting resources when the plant is going to come anyway?”

Even the most educated will ask this question. Just be prepared mentally for such viewpoints and think about why you are out here and what you will say in reply. Expect the unexpected. Here are some suggested responses:

Even if we cannot keep the plants out completely, we can prevent a lot of widespread damage. Prevention also gives us time to adopt new control methods as they are developed in the future. The longer we keep invasives out of a lake, the longer we put off the enormous costs of management and property devaluation.

“Aren’t all plants bad anyway?”

It is important to clear up this misconception! This is what you can say:

Native plants are essential lifelines for an aquatic ecosystem, providing the basis for all life within. The problem lies with non-native, invasive plants that have no natural inhibitors and, therefore, outcompete native plants, lowering the water body’s aquatic diversity.

“I don’t have time for this... I know all about it already!”

This remark is fairly common. If the boaters do not wish to help you with the survey, you must

respect their rights and let them be. In such a situation, the suggested action would be to offer them a brochure and wish them a nice day.

“Why did it take Wisconsin so long to do something, when milfoil has been a national problem for over a decade?”

There is no good answer to this question because it’s a very good point. Here is how you can respond:

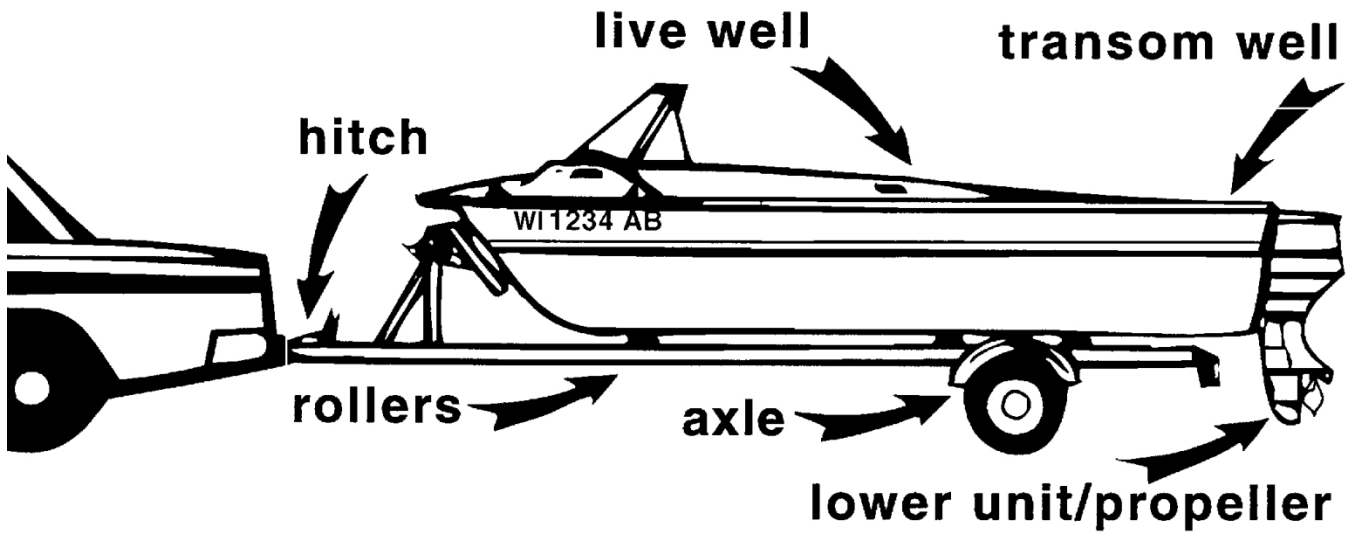
Traditionally, environmental problems become established before we do anything about them. In this case, we have learned from other states, and are trying to take action well before these plants spread to many of our sensitive environments. Instead of focusing on what could have been done, we should focus energies on the present and future.

“Why do I have to take these prevention steps when I only use my boat in one lake?”

This question gives you the opportunity to talk about the value of changing our behaviors and why it is important.

That’s a great question! Although you always visit the same lake, it is still useful for you to take these prevention steps every time you boat. Repeating these steps helps the actions become a regular part of your boating behavior, so that if you do ever decide to take your boat to another lake, you will remember to take the prevention steps. Prevention is the key to stopping the spread of aquatic invasive species.

Watercraft Check Points



Watercraft Check Points

Trailer:

- ✓ Axle
- ✓ Bunks
- ✓ Frame
- ✓ License Plate
- ✓ Lights/wiring
- ✓ Rollers
- ✓ Spare Tire
- ✓ Wheels
- ✓ Winch Rope

Boat Accessories:

- ✓ Anchor
- ✓ Bow Line
- ✓ Ladder
- ✓ Tow Rope
- ✓ Transducer

Other Accessories:

- ✓ Bait Bucket
- ✓ Fishing Line
- ✓ Landing Net

- ✓ Tackle

Boat:

- ✓ Floor
- ✓ Hull
- ✓ Livewell
- ✓ Transom Well

Motor:

- ✓ Intake Pipe
- ✓ Prop
- ✓ Lower Unit

How to Handle Violations

With thousands of boaters traveling throughout the state and with many of those boaters jumping from lake to lake within one day, it is very realistic to expect someone to try to launch a weed-filled trailer at your landing. Since 2001, it has been illegal to launch a boat or trailer with aquatic plants or zebra mussels attached, and in 2009 it became illegal to transport aquatic vegetation or water from one place to another, in addition to other AIS laws (see Section 3 for more details). Not all folks know about Wisconsin's AIS laws. Even after a number of publications, news articles, and television programs concerning invasive species, not all boaters realize the importance of their action or lack of action in preventing the spread. Keep in mind that you should first try to educate the public.

If you choose to report launching violations, make sure you have done your homework. Contact your local DNR Conservation Warden and local law enforcement to let them know that you'll be doing inspections. Ask if they are willing to provide you with support in the case of a violation, what information is necessary for enforcement, and more importantly, ask whether the enforcement officer will be willing to act on a violation if he or she has not witnessed the event. Knowing these answers before the event will certainly predict a better outcome.

So what happens when a boater violates an AIS law? Several options can occur, from the least offensive reaction to the strongest objections to remove and comply with the law.

The soft touch: Boaters who are unaware of the AIS laws will probably put the boat in the water and think nothing about it. Unfortunately, this has been the practice for many years, which is one reason Wisconsin is struggling to control the spread of aquatic invasive species. However, you have an opportunity to educate that boater about the dangers of invasive plants and the prevention steps that boaters need to take each time they leave a body of water. With luck, boaters will listen to your message and remove aquatic plants and drain all water without any assistance.

An assertive approach: So what do you do if a boater doesn't get the point? Offer to assist the boater in checking and removing any aquatic plants. Always ask permission first before you touch any boat, trailer, or personal equipment. If the boater gives you permission, go ahead and help remove the plants and ask if you can keep a sample, especially if you suspect an invasive species. Let the boater know that you're just trying to prevent them from receiving a citation from any law enforcement or wardens that stop by, because the wardens are stepping up the number of citations they're issuing for AIS violations.

The strongest approach: And what if the boater refuses to remove the aquatic plants or drain water from their boat and equipment? At this time, you really stress the fact that it is illegal to not comply with the prevention steps that you're recommending, and you use the Violation Report form to record the basic information that a law enforcement officer requires in order to pursue the complaint. If you take a picture, it should include the boat registration number and attached plants. Usually, by this last step, the boater complies, the plants come off the boat, and the lake remains safe from another invasive inoculation.

If the boater chooses to launch after all your efforts, then you can report the facts to a law enforcement officer. The definition of "law enforcement officer" for purposes of section 30.715 (4), Wisconsin Statutes, is noted at section 30.50 (4s), Wisconsin Statutes, which reads:

30.50 (4s) "Law enforcement officer" has the meaning specified under s. 165.85 (2) (c) and includes a person appointed as a conservation warden by the department under s. 23.10 (1).

Section 165.85 (2) (c), Wisconsin Statutes, in turn defines "law enforcement officer" as any person employed by the state or any political subdivision of the state, for the purpose of detecting and preventing crime and enforcing laws or ordinances and who is authorized to make arrests for violations of the laws or ordinances that the person is employed to enforce.

The definition of “law enforcement officer” is obviously very broad and would clearly allow law enforcement officers of counties and municipalities throughout the state to enforce the AIS regulations and laws. Your best resource is your regional DNR Water Guard or local DNR Conservation Warden. Before you pursue any enforcement action, make contact with your local warden to know what information the warden expects from you. The warden will decide how to process the violation.



We are excited to now have DNR Conservation Wardens devoted primarily to providing education and enforcement on the AIS laws and regulations. Each DNR region in Wisconsin has at least one Water Guard; in some cases, more than one.

Photo provided by WDNR6 - 17

AIS Violation Report Form

Landing/Location: _____
Date: _____ Time: _____ AM or PM
County: _____ Town/Village/City: _____
Vehicle License Number: _____ State Registered: _____
Boat Registration: _____ State
Registered: _____ Car/Boat/Personal Watercraft Information - Year: _____
Make: _____ Model: _____ Color: _____ Violator Information:
Male or Female Name of Boat
Operator: _____
Hair: _____ Eyes: _____ Approx. Height/Weight: _____ Other
Description (clothing, etc.): _____ Photo Taken
of Violation: Yes or No Description of
Violation/Comments: _____

-

-

_ CBCW Inspector's Contact Information - Name: _____ Phone
Number: _____
Address: _____

_ Please check box if law enforcement may contact you for more information about the violation. You will
 remain confidential in this case. Please check box if you do not want law enforcement to contact you
for more information about the violation. **To report the violation, contact your area Water Guard
or DNR Warden OR call 1-800-TIP-WDNR** Regional Water Guard Contact Info:

_____ Local DNR Warden Contact Info:

Appendix 6

Water Flea Monitoring Protocol

Based on water fleas monitoring protocol developed by Pieter Johnson, UW – Madison Limnology Department - April 2006.

Annually the DNR staff selects water bodies to sample for water flea infestations. This protocol is designed to assist DNR staff in collecting samples, shipping, reporting and how the information is released for public knowledge. Using this protocol will standardize the collection techniques, improve the quality of collected samples, limit the number of contaminated samples and ensure an accurate water flea infestation database.

Water Flea Monitoring

Sampling Equipment:

- Boat/Anchor
- 0.5-1 meter diameter, 250-micron mesh plankton net
- Rope on net with the meter increments marked
- Vinegar/Large container to hold plankton net for vinegar bath
- 250 ml plastic bottles
- 1-liter plastic bottles
- Alcohol, 95% alcohol (190 proof ethyl alcohol)
- Lake Maps
- Sharpie/Labels for Bottles
- Water flea data collection sheet
- Cooler with ice
- Change for car wash (you may want to make a map of the car wash stations in your area)
- GPS unit

The Department updates the water flea listing annually after sampling results are compiled and then issues a press release listing those waters infested with water fleas and other invasive species. The Department issues a second press release and list prior to the opening of the fishing season reminding boaters to take precautions to avoid spreading spiny waterfleas and other invasive species. A current water flea infestation map can be found at this website: <http://dnr.wi.gov/invasives/aquatic.htm>

Spiny water fleas (*Bythotrephes longimanus*) are large (up to $\frac{3}{4}$ inch), predatory crustacean zooplankton native to parts of Europe and Asia. They have been established in all of the Great Lakes since 1992 and have begun moving into inland lakes in Ontario, Minnesota, Ohio, Michigan and, most recently, Wisconsin. Outside of Mysis shrimp, spiny water fleas are considerably larger than any naturally occurring lake zooplankton. They are readily distinguished by their long tail spines, which generally support between one and three barbs. Fish hook water fleas (*Cercopagis* sp.) are another predatory crustacean zooplankton known to have invaded the Great Lakes. At this time, however, their movement into inland lakes has been limited primarily to upstate New York. Both spiny and fish hook water fleas are often first noticed by anglers and recreational lake users. These invasive water fleas have a tendency to become entangled on fish lines, anchors, downrigging cables, and other types of gear used in boating activities. Extreme care should be exercised to avoid transporting these organisms among lakes.

Sampling:

Frequency

Three samples should be collected from a particular lake on three dates between June and September (for a total of nine samples per lake). Ideally, samples should be collected at monthly intervals after the water temperatures reach 54 degrees. The first collection dates will vary from early to late June. If you choose not to sample the same lakes on each of the three sample periods, please contact the analytical lab so that they can make the appropriate changes to the database.

Sample Location



On each sampling date, water flea samples should be collected from three different locations in a lake. The sites should be in different bays or basins or at several of the more heavily used lake sites. The three sampling sites should be deep enough to sample, so perhaps in 15 to 20 feet of water is a good rule of thumb. Ideally, the deepest point of the lake and areas near boat landings (sites of boat traffic) or lake's outlet are the best locations to sample. Shallower lakes can be sampled as well by making more of a horizontal tow so as not to disturb the bottom of the lake. Mark on the lake map where samples were collected. These same sites should be used for each of the sample periods – if not, then submit a revised map with subsequent samples.

Collection

1. Collect sample with a large diameter (0.5-1 meter opening) zooplankton net with a mesh size of 250 microns. Smaller nets can easily clog with small forms of phytoplankton and zooplankton and can allow spiny water fleas to elude capture.
2. A 100 meter horizontal tow is best suited for capturing water fleas. A GPS unit (to measure distance and/or rate of travel) can be used to tow the net for 120 seconds at a low boat speed (~3 km hr⁻¹) that prevents the net from surfacing (horizontal tows are facilitated by adding weight to the zooplankton net; tie a loop in the rope approximately 0.5-1 meter in front of the net and attach a weight (e.g., a brick with a hole in it) using an additional piece of rope or cable tie). Ideally, horizontal tows should be oblique (Figure 1), sampling from the top of the thermocline to just below the water's surface. Care must be given that the net does not hit the lake bottom. When this happens, the sample is of muddy water, which is very difficult or impossible to analyze. If you hit the lake bottom, rinse out the sampling equipment and go to a different area of the lake that will provide enough depth for a good tow.
3. Be sure to rinse the net from the outside of the net so that all of the material washes into the plankton collection cup. If water fleas are present, they will likely be visible immediately within the collection cup (but not always).
4. Record sampling information on the water flea collection data sheet.
5. Decant your plankton sample into a 250 ml sample bottle after each tow.

Watercraft Inspector Handbook

6. Condense the size of the sample by filtering out as much water as possible in the field. This helps reduce the amount of alcohol that needs to be added and aids in the analyses as well.
7. Preserve the sample using 95% alcohol. The ratio should be 4 parts alcohol to 1 part sample. Note: If the prescribed alcohol to sample ratio (4:1) can not be achieved after repeated condensing and decanting, then the sample should be split between two sample bottles. Label each with the same information (as specified under “Processing the Sample – Field”), and label one as “Split 1 of 2” and the other as “Split 2 of 2”.
8. Repeat the process at the other two pre-selected sites. Composite the samples from the three sites into one 250-ml or larger (1-liter) bottle and receive a single enumeration for the lake. Note: If samples are shipped by common carrier, size restrictions may apply to the sample containers. The maximum size

allowed under the US DOT regulations for plastic containers is 1 liter – check with the shipper for any additional restrictions prior to sampling so that samples are collected in appropriately sized bottles.

9. Transport the sample bottle(s) on ice in a cooler.
10. Local laboratory identification of waterfleas can be conducted by the region water quality biologist. Spiny and Fishhook Waterflea Watch and Wild cards are excellent resources for identification. Confirmation samples may be mailed to the DNR Southeast Region analytical lab, (Jim Steinke, via e-mail at james.steinke@wisconsin.gov or 920-892-8756 ext. 3035). Provide your contact information as well so that the lab can get in contact with you. The analytical lab will e-mail back to you a receipt of the samples and the results when they are completed.

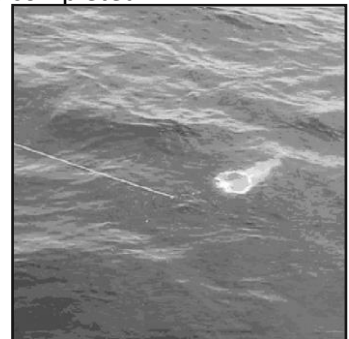


Figure 1. Water flea plankton net tow pulled behind a slow-moving boat.

Processing the Sample – Field



Attach a label to each sample bottle and include the following information. Be sure to write legibly and with indelible ink (e.g. Sharpie) – do not use a ball point pen, as the ink is soluble in alcohol.

Label sample bottles with the following information:

- Sampler's name
- Sampler's phone number - important, as the analytical lab may need to contact you regarding the sample
- Lake name
- WBIC
- County
- TRS
- optional - Sample site Latitude/Longitude locational data using a GPS unit
- Site number
- Net opening diameter (0.5m or 0.3m)
- Sample date
- Number of tows
- Depth of the tows
- Preservatives added

Shipping Samples:

Water flea samples, preserved with ethanol (4 parts ethanol: 1 part sample), are hazardous materials because of their flammability (the flash point of a 4:1 ethanol/water solution is

approximately 72° F). Any staff preparing specimens for shipment MUST attend a hazardous training workshop. These workshops are offered annually at the spring watercraft inspector meeting. The certificate of completion is good for three years.

It is mandatory that we use the State Spee-Dee Delivery contract to send samples within Wisconsin, unless they are not available in your region. All veliger samples should be shipped monthly to Plymouth. Do not store all of your samples until the end of the season. Here are websites for Spee-Dee:
<http://www.speedeedelivery.com/walkin-wi.html>
<http://www.speedeedelivery.com/OnCallLetter.pdf>

Decontamination Procedures:

When multiple lakes are sampled on the same day, the net, boat and all other sampling equipment must be decontaminated between lakes. Decontaminating will eliminate cross contamination and reduce the risk of transporting invasive species from lake to lake. You do not have to decontaminate equipment between sample sites on the same lake. If multiple lakes are sampled in one day, it is recommended to sample any lakes that are not on the watch or infestation lists before sampling lakes on those lists, to minimize the potential for transport

- Remove any organic material from sampling gear. There are several options for disinfecting smaller gear. *Dissolved oxygen probes and other sensitive electronic sampling*

gear may be damaged by disinfection solution and should only be rinsed with clean water. For other gear used in water choose one of the following options:

Option one: The gear can be sprayed with the disinfection solution and a wet surface maintained for the appropriate contact time. The gear should be rinsed with clean water or water from the next waterbody before it is used again.

Option two: Fill a tub with disinfection solution and place all equipment in the tub for the appropriate contact time. The gear should be rinsed with clean water or water from the next waterbody before it is used again.

Option three: Use a completely new set of gear for each waterbody during the work day and disinfect all gear at the end of the day using option one or two.

** If water fleas are observed, extreme care should be taken to avoid

transporting individuals. We recommend that you use a different net if you have additional lakes to sample or discontinue sampling for that day to allow for sufficient decontamination if you do not have another net.

Regardless, it is a good idea to rinse your equipment in hot water and let the net and cup dry thoroughly for at least 24-48 hours after a day of sampling, both to preserve the integrity of the net and reduce the risk of any resting eggs remaining viable.

- You should wash the boat between lakes following the DNR boat cleaning procedures. Please refer to the agency guidelines at the beginning of this Section of the handbook.
- Another approach that has been quite effective in some areas is to benefit from citizens that offer to take our technical staff onto the lake with their boats. This saves time because we don't have to launch and then decontaminate the trailer and boat upon departure.

Listing Guidance

The Wisconsin Department of Natural Resources is monitoring some of our inland waters for the presence of water fleas. This guidance document provides listing recommendation criteria for when to place a water body onto the Infested List. A review team consisting of the statewide and regional AIS staff

makes the final determination for listing a waterbody.

DNR lists a waterbody as infested for water fleas when we have data indicating that there is an established reproducing population. Lakes that are hydraulically connected to waterbodies infested for water fleas are placed on to the Water Flea Watch List. Nearby waterbodies that are not hydraulically connected may also be put on to the Watch list based recommendation by the area biologist and decision of the Exotic Species Coordinator and review team.

Notification/Releasing Water Flea Information

Standard Notification Sequence:

Following the Water flea listing criteria cited above, the regional biologist and the statewide coordinator have concurred that the waterbody should be listed. The regional biologist informs the Public

Information Officer (PIO), wardens, fishery and water resources staff, volunteer monitors, and management at the regional level about the sighting. The regional staff, in consultation with the statewide coordinator, determines if a press release is needed. Prior to issuing a press release, the regional biologist notifies the local entities affected by the sighting (lake association or district and industries or water utilities). Attached, as an addendum to this report, is a sample press release that can be used as a template. After the press release is issued, the regional biologist coordinates any follow-up actions that are necessary including posting signs, additional monitoring, or information and education (I&E)/outreach efforts.

State of Wisconsin
Department of Natural Resources
Wisconsin Lakes Partnership

Water Flea Tow Monitoring Report

Form 3200-128 (R 02/10)



The purpose of this form is to track the presence/absence of spiny or fishhook water fleas collected using a plankton net during AIS monitoring.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector			
Name		Phone Number	Email
Monitoring Location			
Waterbody Name		WBIC	County
			Township Name
Date and Time of Monitoring			
Start Date	Start Time	End Date (= Start Date)	End Time
Monitoring Results			
Method used: <input type="checkbox"/> horizontal tows (near surface) <input type="checkbox"/> oblique tows (thermocline to surface) <input type="checkbox"/> vertical tows (bottom to surface)			
Diameter of plankton net opening 30cm 50cm other_____ (circle one)			
Site 1: Latitude (optional): _____		Longitude (optional): _____ <input type="checkbox"/> Preservative Added	
Secchi depth (m) _____ (optional)		Depth sampled (if vertical or oblique tow) _____ ft/m circle one	
Site 2: Latitude (optional): _____		Longitude (optional): _____ <input type="checkbox"/> Preservative Added	
Secchi depth (m) _____ (optional)		Depth sampled (if vertical or oblique tow) _____ ft/m circle one	
Site 3: Latitude (optional): _____		Longitude (optional): _____ <input type="checkbox"/> Preservative Added	
Secchi depth (m) _____ (optional)		Depth sampled (if vertical or oblique tow) _____ ft/m circle one	
<input type="checkbox"/> Have you consolidated all of your samples into one composite bottle?			
<input type="checkbox"/> Have you sent your samples to the DNR Plymouth Service Center?			
During this monitoring trip, did you find what you suspect are Spiny or Fishhook Waterfleas in this waterbody? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Voucher Sample			
If you found Spiny or Fishhook Water fleas, did you collect a voucher specimen and bring it to your local DNR office? If so, which office?			
<input type="checkbox"/> Rhinelander	<input type="checkbox"/> Spooner	<input type="checkbox"/> Green Bay	<input type="checkbox"/> Oshkosh <input type="checkbox"/> Did not take sample to a DNR office
<input type="checkbox"/> Fitchburg	<input type="checkbox"/> Waukesha	<input type="checkbox"/> Eau Claire	<input type="checkbox"/> Superior <input type="checkbox"/> Other Office: _____

If you find Spiny or Fishhook Water Fleas

Please bring a copy of this form, along with a voucher specimen and if possible, a map showing where you found the suspect waterfleas to your regional Citizen Lake Monitoring Coordinator at the DNR. All initial discoveries should be placed in rubbing alcohol until verification by an expert is obtained.

If you don't Find Spiny or Fishhook Water Fleas

If you submit your data online, that is all you need to do. Otherwise, please mail a copy to your regional DNR Citizen Lake Monitoring coordinator. <http://dnr.wi.gov/lakes/contacts>

For DNR staff to fill out					
Volume of sample that was analyzed (ml)			Date analyzed		
Name of plankton sample analyst:					
Name of person or museum who identified the voucher specimen					
Was the specimen confirmed as....?					
Spiny Waterflea?	Yes	No	Fishhook Waterflea?	Yes	No



Have you entered the results of the voucher in SWIMS?			Yes	No
<i>DNR staff: Please enter voucher information for new AIS findings into SWIMS under the Incident Report Project for your county (Choose Incident Report Form in SWIMS). Enter date of sampling for "Start Date", Person who identified specimen as "Data Collector", and Monitoring location as "Station".</i>				

Press Release Template for Waterbodies to be Placed on the Water Flea Infested List

___ (numbers) Water fleas were recently found in ___ (waterbody) in ___ (county). The adults were detected as part of routine monitoring on ___ waterbody OR were discovered as part of a general lake/river survey (i.e., examining shores, and boat landings).

“The number of Water fleas found indicate there is a reproducing population in ___ (waterbody)” according to ___ from the ___ Regional office. “The ___ (waterbody) will be placed on DNR’s ‘Infested List’.

Placing ___ waterbody on the ‘Infested List’ means DNR will post the ‘Exotic Species Advisory’ signs with Water flea decals at all the landings to notify the public that ___ waterbody is infested. The DNR will also work with local units of government to increase public awareness efforts and outreach efforts to control the further spread of spiny water fleas. It also affords volunteers the opportunity to become more involved by helping monitor ___ waterbody for Water fleas and/or through watercraft inspection efforts.

Since 1992, the Great Lakes have been infested with Water fleas and now the spiny water fleas are moving into inland lakes in Ontario, Minnesota, Ohio, Michigan and most recently, Wisconsin. Spiny water fleas are a small shrimp like animal that grows to an average of 0.4 inches in length and feeds on other small animals. Although spiny water fleas are tasty to fish, it is protected from small fish predators by an unusually long tail spine.

Fish feeding on spiny water fleas have great difficulty ingesting the tiny zooplankton. Spiny water fleas can have a profound effect on the fish population because it feeds on the zooplankton that small fish depend on for survival.

“There are prevention steps that everyone should take when boating, fishing and otherwise enjoying the water that can help prevent the spread of invasive species,” says _____.

Before moving your boat/equipment to a new waterbody:

- Inspect and remove plants, animals, and mud from your boat and equipment;
- Drain all water from your boat’s live wells, bilge, motor, etc.;



- Don't move live fish away from a waterbody;
- Dispose of your unwanted bait in the trash. Use leftover minnows only under certain conditions;
- Rinse your boat and equipment with high-pressure and/or hot water OR
- Dry your boat and equipment thoroughly for at least 5 days.

FOR MORE INFORMATION CONTACT: Regional ANS Coordinator and/or regional biologist (two contacts are preferred)



SpinyWaterflea_MonitoringProtocol.pdf

Appendix 7

Dreissenid (Zebra and Quagga) Mussel Monitoring Protocol

Annually the DNR staff selects over 100 water bodies to sample for zebra and quagga mussel infestations. This protocol is designed to assist DNR staff in collecting samples for adult and veliger (larval form) Dreissenid mussels. Additionally, this protocol provides guidelines on how the zebra and quagga mussel information is reported and how the information is released for public knowledge. Using this protocol will standardize the collection techniques, improve the quality of collected samples, limit the number of contaminated samples and ensure an accurate zebra mussels infestation database.

The Department updates the zebra mussels listing annually after sampling results are compiled and then issues a press release listing those waters infested with zebra mussels and other invasive species (including quagga mussels). The Department issues a second press release and list prior to the opening of the fishing season reminding boaters to take precautions to avoid spreading zebra mussels and other invasive species. In addition, a list and a map showing the infested waters are included on the DNR web page: <http://dnr.wi.gov/org/water/wm/GLWSP/exotics/zebra.html>

Veliger Monitoring

Sampling Equipment:

- Boat
- Anchor
- 50-cm diameter, 64-micron mesh plankton net, 5:1 length:diameter ratio
- Rope on net with the meter increments marked
- Chlorine bleach
- Large container to hold plankton net for bleach solution
- 250 ml plastic bottles
- 1-liter plastic bottles
- Alcohol, 95% alcohol (190 proof ethyl alcohol)
- Lake Maps
- Labels for Bottles (contact Scott)



Van Egeren for labels)

- Sharpie
- Zebra mussel veliger data form (see appendix 1)
- Cooler with ice
- Change for car wash (you may want to make a map of the car wash stations in your area)
- GPS unit - optional

Ordering Information:

Nets

If you need a sampling net, please contact Scott Van Egeren. He has catalogs and information on how to order nets, or sampling nets can be ordered from:

Research Nets Incorporated

14207 100th Ave. NE

Bothell, WA

(425) 821-7345

The standard net specifications are:

0.5 meter mouth (for 2 meter tows) or

0.3 meter mouth (for 5 meter tows)

5 to 1 length to diameter ratio

64 micron mesh size

0.5 meter towing ring with a single point
bridle

3.5" PVC 2 piece collecting bucket

Ethyl Alcohol

Ethyl alcohol is available from the University of Wisconsin Madison at Materials Distribution Services (MDS). You can place your order by phone or via their web page. However, MDS will only ship the alcohol to Madison by common carrier (UPS, US Postal, etc.) because 190 proof ethyl alcohol is a hazardous material. You must also purchase it by the case (4 gallons) because they will not break up a case. You will

have to pick up the alcohol in person or arrange delivery with traveling DNR staff from Madison.

One case (4 gallons) of 95% alcohol (190 proof ethyl) costs \$51.14, (2010 costs). For ease in ordering, an account number (MD13912) has been set up with MDS.

The catalog number is 2293-CASE.

Please specify both account and catalog numbers when placing an order.

The address for MDS is:

Material Distribution Services

1061 Thousand Oaks Trail

Verona, WI 53593 Phone # 608-497-4400

<http://www.bussvc.wisc.edu/mds/mds.html>

For directions on how to get to MDS to pick up your alcohol, go to: <http://www.bussvc.wisc.edu/mds/location.html>

<http://www.bussvc.wisc.edu/mds/location.html>

Pre-sampling Preparation:

Contact Lab

Prior to sending samples, notify the DNR

Southeast Region analytical lab, (Jim

10 - 10

Steinke, via e-mail at james.steinke@wisconsin.gov or 920-892-8756 ext.

3035) with specifics on the number of samples, collector, sample sites and dates. Provide your contact information as well so that the lab can get in contact with you. The analytical lab will e-mail back to you a receipt of the samples and the results when they are completed.



Sampling:

Sample Frequency

Three samples should be collected from a particular lake on three dates between June and September (for a total of nine samples per lake). Ideally, samples should be collected at monthly intervals after the water temperatures reach 54 degrees. The first collection dates will vary from early to late June. If you choose not to sample

the same lakes on each of the three sample periods, please contact the analytical lab so that they can make the appropriate changes to the database.

Sample Location

On each sampling date, veliger samples should be collected from three different locations in a lake. The sites should be in different bays or basins or at several of the more heavily used lake sites. The three sampling sites should be fairly close to hard substrate (i.e. habitat such as rocks or piers) but deep enough to sample, so perhaps in 15 to 20 feet (4 to 6 meters) of water is a good rule of thumb. Avoid collecting the veliger sample from an open-water deep mid-lake site. Additional samples can be taken in bigger bodies of water where there may be multiple fingers, bays, or multiple boat launches. Mark on the lake map where samples were collected and optionally collect GIS coordinates. These same sites should be used for each of the sample periods – if not, then submit a revised map with subsequent samples.

Sample Collection

The volume of water that you sample can generally be determined by the trophic status of the lake. A highly eutrophic lake will quickly fill the net-bucket with plankton and provide a dense enough sample to examine for veligers. However an oligotrophic lake requires sampling a greater volume of water to collect a sufficient sample. Using the standard plankton net (50-cm diameter*, 64 micron mesh) the volume of

water to collect for the different trophic conditions are:

- Oligotrophic lakes (Secchi > 4m) collect two 2 meter tows from each site. Consolidate to 1 sample for each site. You will have sampled 4-meters of water per site.
- Mesotrophic lakes (Secchi 2-4m) collect one 2 meter tow from each site. You will have sampled 2-meters of water per site.
- Eutrophic lakes - (Secchi < 2m) collect one 1-meter tow from each site. Samples from eutrophic lakes are more difficult to analyze, so reducing the sample volume will facilitate the process. You will have sampled 1-meter of water per site.

**note: if using the 30-cm diameter net, you should sample five 2-meter tows for oligotrophic lakes, three 2-meter tows for mesotrophic lakes and three 1-meter tows for eutrophic lakes to obtain relatively the same volume of water as above.*

Lower the net into the water at the first of the three pre-selected sites. Pull the net up vertically. Care should be taken to pull the net up slowly enough so that no pressure wave is created on the surface of the water. If you are creating a pressure wave, you are under-sampling the water column. Be sure to rinse the net from the outside of the net so that all of the material washes into the plankton collection cup. Record sampling information on the zebra mussel data collection form (see appendix 1).

- Care must be given that the net does not hit the lake bottom. When this happens, the sample is of muddy water, which is



very difficult or impossible to analyze. If you hit the lake bottom, rinse out the sampling equipment and try shorter tows (e.g. two 1-meter tows instead of the protocol of one 2-meter tow), or go to a different area of the lake that will provide enough depth for a good tow.

- For shallow lakes where it is impracticable to do a vertical tow, collect a horizontal sample at mid-depth. In shallow lakes, you may split the sampling depth (i.e., two one-meter tows with the 50-cm net or five one-meter tows with the 30-cm net).
- Condense and decant your plankton sample into your bottle after each tow to obtain an accurate enumeration of the larval density in your lake. For example, if you had two 2-meter tows, you would wash down the net from the outside and condense the sample for each of the 2-meter tows. Both samples should be placed into the 250-ml plastic bottle or 1-liter bottle. (Use the smallest bottle size that is practical, but you may need to use a 1-liter bottle due to the sample size).

Note: If samples are to be shipped by common carrier, size restrictions may apply to the sample containers. The maximum size allowed under the US DOT regulations for plastic containers is 1 liter – check with the shipper for any additional restrictions prior to sampling so that samples are collected in appropriately sized bottles.



- Condense the size of the sample by filtering out as much water as possible in the field. This helps reduce the amount of alcohol that needs to be added and aids in the analyses as well.
- Preserve the sample using 95% alcohol. The ratio should be 4 parts alcohol to 1 part sample.
Note: If the prescribed alcohol to sample ratio (4:1) can not be achieved after repeated condensing and decanting, then the sample should be split between two sample bottles. Label each with the same information (as specified under “Processing the Sample – Field”), and label one as “Split 1 of 2” and the other as “Split 2 of 2”.
- Repeat the process at the other two preselected sites. You will have 3 samples for each lake
- Alternatively, you can composite the samples from the three sites into one 250-ml or larger (1-liter) bottle and receive a single enumeration for the lake. Obviously, with the composite sampling, you lose specific sample location information, but either approach is acceptable.
- Transport the sample bottle(s) on ice in a cooler.

Processing the Sample - Field

Attach a State Lab of Hygiene, or comparable, label to each sample bottle and include the following information. Be sure to write legibly and with indelible ink (e.g. Sharpie) – do not use a ball point pen, as the ink is soluble in alcohol. Additional labels may be obtained by contacting Scott Van Egeren.

Label sample bottles with the following information:

- Collector’s name
- Collector’s phone number - important, as the analytical lab may need to contact you regarding the sample
- Lake name
- WBIC
- County
- TRS
- Sample site Latitude/Longitude locational data using a GPS unit (*optional*)
- Site number
- Net opening diameter (0.5m or 0.3m)
- Sample date
- Number of tows
- Depth of the tows
- Preservatives added

Shipping/Delivering Samples:

Please deliver the veliger samples to: Jim Steinke

Plymouth Service Center

1155 Pilgrim Road

Plymouth, WI 53073

Phone # 920-892-8756 ext. 3035

Shipping Samples Containing Ethanol

Veliger samples, preserved with ethanol (4 parts ethanol: 1 part sample), are hazardous materials because of their flammability (the flash point of a 4:1 ethanol/water solution is approximately 72° F). Ethanol solutions are classified as flammable liquids by the US Department of Transportation and the shipment of such materials is governed by US DOT’s regulations - with a couple of exceptions, as listed below.



Transport in State Vehicles Hazardous materials, including ethanol solutions, can be transported in State of Wisconsin vehicles, without the need to comply with any US DOT regulations. Thus, it is permissible to ship these samples by state vehicle. The hazardous nature of the samples is not diminished simply because no shipping requirements pertain to this mode of transport, and some common sense precautions should be taken when using this means of shipping:

- Samples should be transported on ice to keep them below their flash point temperature.
- Samples should not be kept where hazardous materials would otherwise not be permitted, e.g., in an office.
- Samples should not be transported in the passenger compartment of a vehicle.
- All employees involved in transporting ethanol-containing samples in a state vehicle should be made aware of the hazard that these samples pose and the precautions that should be taken to minimize those hazards.

US Postal Service The US Postal Service has its own set of requirements for shipping hazardous materials, and therefore it is not subject to the US DOT hazardous materials regulations. Guidance for shipping ethanol solutions via the USPS is available on the Intranet at: http://intranet.dnr.state.wi.us/int/es/science/ls/fpm/EtOH_usps.pdf and also on the USPS website at: <http://www.usps.com/cpim/ftp/pubs/pub52.pdf>. The USPS regulations provide a limit of one container (not to exceed 1 pint for a nonmetal container) per mail-piece. Given this limitation, the USPS will generally not be a practical alternative for shipping these samples.

Common Carriers

The US DOT regulations (49 CFR, Parts 171 – 180) apply when shipping samples via common carrier. Many of the familiar shipping companies provide hazardous material shipping service. The US DOT regulations begin with training requirements for those who offer hazardous materials for shipping via a common carrier. Therefore, any staff member who prepares ethanol-containing samples for shipment via a common carrier must be trained in accordance with the requirements of the US DOT regulations. Additional requirements apply to packaging, packing, marking, labeling and documentation. The regulations are available at: <http://www.myregs.com/dotrspa/>. Some shipping companies have additional requirements, or more restrictive requirements than the US DOT regulations. Table 1 summarizes some of the basic information about shipping hazardous materials with some of the common shipping companies.



Table 1 - Shipping Hazardous Materials via Common Carrier

Shipping Company	Ship Hazardous Materials?	Website	Service Restrictions
DHL	No		
Dunham Express	Yes	http://www.dunhamexpress.com/index.html	
FedEx	Yes	http://www.fedex.com/us/services/options/ground/hazmat/	Must be qualified before shipping. Packaging must be approved. Maximum volume per package = 16 L. Not accepted at all offices. Pick up service may not be available.
Spee-Dee Delivery	Yes	http://www.speedeedelivery.com/faqs.html	
UPS	Yes	http://www.ups.com/content/us/en/resources/prepare/hazardous/index.html	Service only on contract basis. Must use UPS compliant software. Packaging must meet specifications. Not accepted at all offices.

Decontamination Procedures:

When multiple lakes are sampled on the same day, the net, boat and all other sampling equipment must be decontaminated between lakes. Decontaminating will eliminate cross contamination and reduce the risk of transporting veligers from lake to lake. You do not have to decontaminate equipment between sample sites on the same lake.

Remove any organic material from sampling gear. There are several options for disinfecting smaller gear. *Dissolved oxygen probes and other sensitive electronic sampling gear may be damaged by disinfection solution and should only be rinsed with clean water.* For other gear used in water choose one of the following options:

- **Option one:** The gear can be sprayed with the disinfection solution and a wet surface maintained for the appropriate contact time. The gear should be rinsed with clean water or water from the next waterbody before it is used again.
- **Option two:** Fill a tub with disinfection solution and place all equipment in the tub for the appropriate contact time. The gear should be rinsed with clean water or water from the next waterbody before it is used again.



- **Option three:** Use a completely new set of gear for each waterbody during the work day and disinfect all gear at the end of the day using option one or two.

You should wash the boat between lakes following the DNR boat cleaning procedures. Please refer to the agency guidelines at the beginning of this Section of the handbook.

Another approach that has been quite effective in some areas is to benefit from citizens that offer to take our technical staff onto the lake with their boats. This saves time because we don't have to launch and then decontaminate the trailer and boat upon departure.

If multiple lakes are sampled in one day, it is recommended to sample any lakes that are not on the watch or infestation lists before sampling lakes on those lists, to minimize the potential for transport.

Adult Zebra and Quagga Mussel Monitoring

The adult monitoring serves several purposes:

- to verify a reproducing population if veligers have been identified as being present in a water sample,
 - to determine the population densities of mussels after an infestation has occurred,
 - to track the spread by collecting additional data on lakes where veliger monitoring is not being conducted, and
 - to monitor for the quagga mussel.
- Rope
 - Buoy float
 - Anchor (e.g. concrete block)
 - Rubbing alcohol
 - Zebra mussel data sheets, Method A and Method B (see appendices 2 & 3)
 - Quagga mussel reporting is discussed below and requires lab verification
 - Hand lens 30X **Method A:**

Adult *Dreissena* (zebra and quagga) mussel monitoring for inland waters is accomplished using one of two methods:

1. Shoreline surveys and regular inspections of structures in the water to determine the presence/absence of zebra and/or quagga mussels.
2. Substrate sampler monitoring (substrate refers to any substance in the water that zebra or quagga mussels may attach to) to estimate population densities.

Sampling Equipment:

- Substrate samplers

Shoreline Surveys

Shoreline surveys and inspections of structures in the water are conducted to identify the presence or absence of adult *Dreissena* mussels. A single observer can monitor thousands of square meters of substrate at a given location in a short period of time – covering a larger surface area than a set of substrate samplers.

Monitoring for the presence or absence of adult zebra or quagga mussels will address two important objectives: 1) document the presence of adult *Dreissena* mussels when veligers have been found during the veliger monitoring, and 2) document multiple year classes of zebra or quagga mussels. These data provide important



information regarding the viability of the population of zebra or quagga mussels in that waterbody.

Collecting Samples

- Conduct shoreline surveys about once every two weeks from ice out to ice on.
- Target areas around public boat ramps or areas that are likely to have a lot of boating traffic in the vicinity (for example, fishing hot spots, resorts, campgrounds, etc.).
- Any solid surface is a suitable substrate to observe. Rub your hands along some of the submerged surfaces. Zebra mussels on the surface will feel like sandpaper.
- Zebra mussels are often found in cracks and crevices of rocks and structures. Small zebra mussels can be attached to plants as well (Figure 1).

NOTE: It is especially important to pay attention to structures removed from the water in the fall of the year or before winter ice forms (for example, docks, piers, boats, buoys, etc.)

Figure 1. Zebra mussels attached to native watermilfoil.



Reporting Zebra Mussel Monitoring Results

Collect any mussels that you believe are zebra mussels, place them in rubbing alcohol and send it to the zebra mussel regional coordinator for confirmation. See zebra mussel contact list in watercraft inspector handbook. If you find what you believe are zebra mussels and note various shapes of mussels of similar size, collect those as well for evaluation of whether or not quagga mussels may also be present.

For tracking the movement of zebra or quagga mussel infestations, a negative report is as important as finding *Dreissena* mussels at a location. All monitoring efforts should be reported on the zebra mussel datasheets and submitted to Ron Martin at 101 South Webster St., Madison, WI 53707. Complete the zebra mussels reporting form Method A, electronically available as form 3200122 A at



<http://intranet.dnr.state.wi.us/itworks/forms/eforms.asp> or a paper copy in Appendix 2.

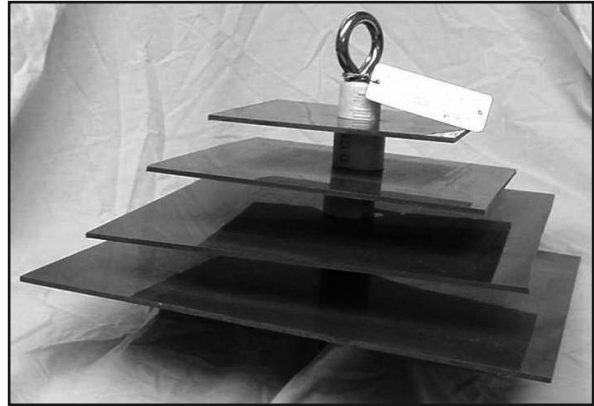
Method B: Substrate Monitoring

Substrate samplers can be used to determine if zebra mussels or quagga mussels are present. When placed in waterbodies without known populations of *Dreissena* mussels, substrate sampler monitoring documents the arrival of zebra or quagga mussels and tracks the spread of these mussels. Substrate samplers can also be useful on lakes with known zebra mussel populations for determining zebra mussel population growth and seasonal abundance, and also for monitoring for the presence of zebra mussels and quagga mussel.

Substrate Sampler Materials

The sampler is a series of four square plates that are 6, 8, 10 and 12 inches in size, pyramiding from smaller plates at the top down to larger plates at the bottom (Figure 2). The plates are made of $\frac{1}{8}$ inch grey plastic PVC stock with $\frac{3}{4}$ -inch CPVC grey pipe for spacers (1-inch sections) between the plates. The sampler is held together with an 8 inch long $\frac{3}{8}$ inch diameter stainless steel eyebolt, plus washers and a wing nut. Each sampler has a DNR tag attached that provides a phone number for further information. Samplers are ordered from Cathy Cleland (Rhinelander, 715-365-8997). Directions to build a substrate sampler are found in Appendix 4. *Note: the substrate samplers are easily disassembled and cleaned for the next sampling season.*

Figure 2. Substrate sampler for zebra mussel monitoring.



Placement of Substrate Samplers

- Place the substrate sampler in an area where there will be little chance of vandalism.
- Hang the substrate sampler from a dock, pier or other structure found in the water. (A float or buoy may be used to suspend the sampler in the water column. If a float is used, a waterway marker application and permit form is necessary before the substrate sampler is placed in the water).
- Put two samplers at each location chosen for monitoring. The top sampler is removed and analyzed every four weeks, then placed back into the lake for the next sampling period. The second (bottom) sampler remains in the water for the entire monitoring season. Securing the two samplers on the same line with clips makes it easy to replace the top one every four weeks.
- A small concrete block anchor works to hold the sampler(s) in place (and provides an additional substrate sampler to examine). Rope can be used to suspend the sampler, but sometimes wildlife will sever the rope. Chains work well to better secure the samplers in those locations.



- Suspend substrate samplers in water, preferably where the water is at least 6 feet deep, but shallower is acceptable. Samplers should be placed at a depth of 6 feet or at mid-depth, whichever is less.
- Place samplers in areas where zebra mussels are most likely to be found. Pay special attention to areas in which zebra mussels may have been transported from infested waterways (for example public boat ramps, water access sites, fishing hotspots, resorts, from the water).

campgrounds or areas where diving ducks tend to reside).

- Avoid placing substrate samplers in areas where there is strong current.

Analysis of Samples for Quantitative Monitoring of Adults

1. Put the samplers in small white or clear garbage bags when they are removed
2. In the lab, disassemble the sampler and examine each plate with a hand lens. Scan the entire plate looking for zebra mussels.
3. Recently settled post-veligers can be very small. If you were to rub your hands along the plate, the surface will feel like sandpaper. If you believe that you have detected post-veligers, please mail them to the Watercraft Inspector to have it examined by the Region Biologist or send it to Jim Steinke following the shipping protocol cited in the veliger monitoring section for verification.
4. Count the number of zebra mussels found on the top and bottom of each plate and record these numbers separately. (use zebra mussel Method B forms, see appendix 3).
5. Report the lengths of the smallest and largest mussels on the plate to the nearest millimeter (1/16-inch). Measure the longest axis of the shell. See diagrams below.



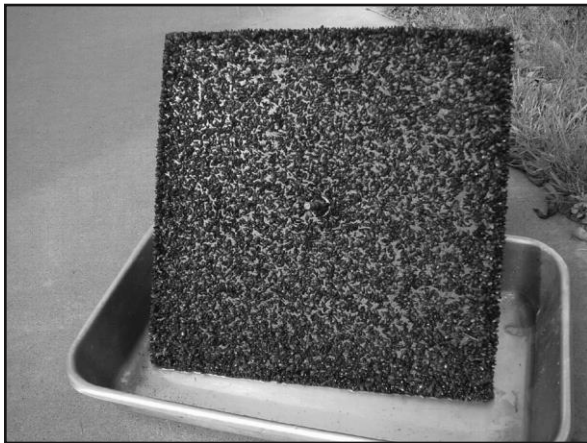
6. For an initial discovery, all zebra mussels collected should be placed in rubbing alcohol for expert verification.
7. For lakes that have zebra mussels and the monitoring is to detect if the quagga mussels are also present:
 - sort the mussels by relative size and shape,
 - compare the shapes
 - ✓ Zebra mussels (*Dreissena polymorpha*) have a flat attachment edge, usually a dark striped shell and are almost as wide as it is tall.
 - ✓ Quagga mussels (*Dreissena bugensis*) have sharp edges on both sides and are fanshaped. The quagga mussel shell is wider and narrower than the zebra mussel. Coloration may range from nearly all white to coloration similar to the zebra mussel.



8. If you believe that you have two differently shaped mussels of the same relative size, place those mussels in alcohol and send them to the Region biologist or Jim Steinke for verification.
9. If there are a large number of mussels attached to the plate (Figure 3), a subset of the plate can be evaluated and reported. The sub-sampling method used must be reported on the lab reporting form.

Note: Sampler plates can be thoroughly scrubbed, dried, reassembled and reused next year.

Figure 3. Substrate sampler from Metonga Lake **Reporting** with attached zebra mussels.



[exotics/zebra.html](http://dnr.wi.gov/exotics/zebra.html).

Complete the zebra mussels reporting form Method B, electronically available as form 3200-122 B at <http://intranet.dnr.state.wi.us/itworks/forms/eforms.asp> or a paper copy in Appendix 3 below.

Samples should be clearly labeled with all requested information. Both field staff and volunteers that monitor for adults use the same data sheets. For tracking the movement of zebra mussel infestations, a negative report is as important as finding zebra mussels at a location. All monitoring efforts should be reported on the zebra mussel reporting form and submitted to Scott Van Egeren.

Field staff should also provide Scott Van Egeren with a lake map showing the location of the monitoring sites. The zebra mussel monitoring sites, along with the names and addresses of the monitors, are maintained and updated periodically. Maps showing all the sampling locations (for adults and veligers) are recorded on the GIS network and are available on the DNR web page: <http://dnr.wi.gov/org/water/wm/GLWSP/>



Zebra Mussel Listing Guidance

The Wisconsin Department of Natural Resources is monitoring some of our inland waters for the presence of zebra mussel veligers using plankton tows and for the presence of post-veligers and adult zebra mussels using substrate samplers. Occasionally sample results from a lake will detect low numbers of zebra mussel veligers in a sample or very few adult mussels of the same size. In both incidences it is clear that a zebra mussel introduction has occurred, but these data do not substantiate that a reproducing population exists in that waterbody. Quagga mussels are present in Lake Michigan coastal areas but have not been found in Wisconsin's inland lakes at this time.

This guidance document provides listing recommendation criteria for when to place a water body onto a Watch List versus an Infested List (a determination has to be made whether there is an established reproducing population). It also presents criteria for delisting a lake in the event that zebra mussels are no longer detected. A review team consisting of the Exotic Species Statewide Coordinator, Ron Martin, and region representatives make the final determination for listing or de-listing a waterbody.

Infested List:

DNR lists a waterbody as infested for zebra mussels when we have data indicating that there is an established reproducing population. Generally speaking, that would mean that we detect evidence of in-lake reproduction.

Watch List:

When veligers, post-veligers or adults are detected in a lake sample, the regional biologist and statewide coordinator (Ron Martin) are contacted. The biologist is requested to conduct a lake survey at their earliest opportunity. In general, the survey would include examining shores, piers and other available substrate near where the plankton tow with the veliger was collected. Additional plankton tows and scuba diving or underwater video surveys may be warranted upon the discretion of the biologist. If the veligers, post-veligers and/ or adult zebra mussels found are all from the same year class, then the waterbody is placed on the "Watch" list to be targeted for additional follow-up work by DNR staff. Waterbodies on the Watch list are monitored for zebra mussels and usually include increased public information and education efforts.

Table 2 provides the zebra mussel listing recommendation criteria. A water body is recommended to be placed on the "Watch" or "Infested" list based on meeting one or more of the criteria. Ultimately, the Regional resource managers, in consultation with the aquatic invasive species program coordinator, determine the appropriate listing for a waterbody.

**Table 2. Zebra mussel listing recommendation criteria.**

Watch List	Infested List
Adults all of the same size, or post-veligers (from substrate analysis) or veligers all from the same year.	Adults zebra mussels of different sizes.
Low numbers of veligers and a substrate evaluation was negative.	Adult zebra mussels found in more than one location of the waterbody. Veligers need not be found.
	Veligers or post-veligers (from substrate analysis) from consecutive years.
	Veligers and adult zebra mussels present.

Footnote: Although the listing criteria reflect monitoring for both veligers (larvae) and adults, it should be noted that only lakes are monitored for zebra mussel veligers, not streams or rivers.

Delisting Criteria:

Unfortunately, once zebra mussels become established in a waterbody it is unlikely that they will be eradicated. Nonetheless, in the event that a waterbody is listed as infested for zebra mussels, but subsequent information indicate that they are no longer present, we can use the following criteria to delist a waterbody as infested.

All of the following need to occur for at least two years to delist a waterbody:

- Based on additional monitoring, no veligers are observed in any of the samples collected from May through September following the standard monitoring protocol.
- Substrate samplers are deployed at three or more locations in the lake from May through September, concurrent with the veliger collections above, and all are negative for zebra mussels.
- A lake survey is conducted and survey results of suitable habitat show no adult zebra mussels are present. (Obviously,

the survey(s) should include the location where zebra mussels had been detected in the past).

- A scuba and/or underwater camera survey is conducted in the area(s) where zebra mussels had been detected in the past (*optional*).

*When these conditions are met the waterbody may be delisted if regional resource managers recommend delisting and the statewide coordinator concurs.

Delisted waterbodies would be moved to the Watch list and continue to be monitored for zebra mussels. Waterbodies on the Watch List remain on that list unless they are moved to the Infested List or if subsequent long-term sampling results indicate that no veligers or adults are present. Hence, no delisting criteria are recommended for Watch List waterbodies.

State of Wisconsin
Department of Natural Resources
Wisconsin Lakes Partnership

Mussel Veliger Tow
Monitoring Report

Form 3200-135 (R 02/10)

The purpose of this form is to track the presence/absence of zebra or quagga mussel larvae (veligers) collected using a plankton net during AIS surveillance monitoring.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. Personally identifiable information collected on this form will be incorporated into the DNR aquatic invasive species database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector			
Name	Phone Number	Email	
Monitoring Location			
Waterbody Name	WBIC	County	Township Name
Date and Time of Monitoring			
Start Date	Start Time	End Date (= Start Date)	End Time
Monitoring Results			
Guidelines for how many tows to collect: If Secchi depth is >4 m (13 feet) take two 2m deep tows; if Secchi depth is between 2-4 m (6.5-13 feet) take one 2m deep tow; if Secchi depth is <2 m (<6.5 feet) take one 1m tow.			
Diameter of zooplankton net opening 30cm 50cm other_____ (circle one)			
Site 1: Latitude (optional): _____ Secchi depth (m) _____	Longitude (optional): _____ Number of net tows _____	Depth of tows (m) _____	<input type="checkbox"/> Preservative Added
Site 2: Latitude (optional): _____ Secchi depth (m) _____	Longitude (optional): _____ Number of net tows _____	Depth of tows (m) _____	<input type="checkbox"/> Preservative Added
Site 3: Latitude (optional): _____ Secchi depth (m) _____	Longitude (optional): _____ Number of net tows _____	Depth of tows (m) _____	<input type="checkbox"/> Preservative Added
<input type="checkbox"/> Have you consolidated all of your samples into one composite bottle?			
<input type="checkbox"/> Have you sent your samples to the DNR Plymouth Service Center?			
COMMENTS/OBSERVATIONS:			
For DNR staff to fill out			
Volume of sample that was analyzed (ml)		Date analyzed	
Name of plankton sample analyst:			
Name of person or museum who identified the voucher specimen:			
Did the samples contain zebra mussel veligers?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	

Have you entered the results of the samples in SWIMS?	Yes	No
---	-----	----

DNR staff: Please enter voucher information for new AIS findings into SWIMS under the Incident Report Project for your county (Choose Incident Report Form in SWIMS). Enter date of sampling for "Start Date", Person who identified specimen as "Data Collector", and Monitoring location as "Station".

State of Wisconsin **Zebra/Quagga Mussel (Quantitative) Report** Department of Natural Resources
Requires use of sampler plates
Wisconsin Lakes Partnership

Form 3200-127 (R 02/10)

The purpose of this form is to track the abundance of adult zebra or quagga mussels in lakes where larvae or adults have previously been detected during AIS surveillance monitoring. A report should be completed for each sampler deployed.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector				
Name		Phone Number		Email
Monitoring Location				
Waterbody Name		Township Name	County	Station Name
Latitude (If not at an existing SWIMS monitoring station)			Longitude (If not at an existing SWIMS monitoring station)	
Date and Time of Monitoring				
Start Date	Start Time	End Date	End Time	
<i>Start Date = Date sampler deployed or since you last removed mussels from the plate. End Date = Date you pulled up the sampler.</i>				
Vertical Measurements				
Water Depth at Monitoring Location		Feet/ Meters (circle one)	Depth to Top of Zebra Mussel Sampler	
			Feet/ Meters (circle one)	
Measurements from where the invasive was found				
Water Temperature		Degrees F / Degrees C (circle one)	Dissolved Oxygen (mg/l)	
Estimated percent cover where sampler plates were located				
Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %	Bottom covered with plants, %
Information about Mussels Found				
Number of Zebra Mussels on Top Side of Plates			Number of Zebra Mussels on Bottom Side of Plates	
Total Number of Zebra Mussels on Sampler			Size of Largest Zebra Mussel (mm)	Size of Smallest Zebra Mussel
Note: if more than 20 zebra mussels are found, measure 20 mussels chosen randomly from the sample. If less than 20 mussels found, measure all mussels. Report results in the table on page 2 of this form.				

Additional Comments

If you find Zebra Mussels

All initial discoveries should be placed in rubbing alcohol until verification by an expert is obtained. Please collect a sample and bring a copy of this form, along with the sample and a map showing where you found the suspect mussels to your regional Citizen Lake Monitoring Coordinator at the DNR.

If you don't Find Zebra Mussels

If you submit your data online, that is all you need to do. Otherwise, please mail a copy to your regional DNR Citizen Lake Monitoring coordinator. <http://dnr.wi.gov/lakes/contacts>

**Zebra Mussel (Quantitative) Report
Requires use of sampler plates**

Form 3200-127 (R 02/08)

Page 2 of 2

Length of Zebra Mussels from Sample

If more than 20 zebra mussels are found, measure 20 mussels chosen randomly from the sample. If less than 20 mussels are

Number	Length (mm)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

13	
14	
15	
16	
17	
18	
19	
20	



ZebraMussel_MonitoringProtocol.pdf