State of Wisconsin 2008 Zebra Mussel Veliger Annual Report

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WISCONSIN
DEPT. OF NATURAL RESOURCES

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INTRODUCTION

Numerous aquatic invasive species have been introduced into the Great Lakes and dispersed into the inland waters of Wisconsin. These introductions can be attributed to intentional release, as we see with the Asian carp in the 1800's, release from aquaria or bait buckets, ballast water release from transatlantic ships entering the Great Lakes, or from canals and other artificial or natural connections to the Great Lakes System. Of particular concern has been the introduction of invasive species via ballast water of transatlantic ships. This has been credited with the recent release of at least 6 invasive species. Since the early 1800's over 180 aquatic species have been introduced to waters of the Great Lakes resulting in the transformation of some of Wisconsin's aquatic ecosystems.

A number of invasive species are found in Lake Michigan and/or Superior. Some of these species include the round goby, ruffe, quagga mussel, white perch and rainbow smelt. These species are currently confined to the Great Lakes but if steps are not taken to avoid their spread, they could invade the inland waters of Wisconsin at any time. Other invasive species such as zebra mussels, Eurasian water-milfoil, and purple loosestrife have already invaded Wisconsin's inland waters. This spread has caused a variety of problems including but not limited to habitat loss and depletion of food sources for native species, and recreational nuisance. As we learn more about the effects of these invasives on inland waters it reinforces the importance of stopping the spread of additional species to the inland waters of the state.

Of the aquatic invasive species that have moved into inland waters, zebra mussels are currently one of Wisconsin's biggest concerns. Zebra mussels are native to the Caspian Sea and Ural River in Asia and in the nineteenth century, they spread west into most of Europe. Around 1988 it is believed that a transatlantic ship released its ballast's water into Lake St. Clair and with it, billions of organisms including the larvae of the zebra mussel *Dreissena polymorpha* (Boelman et

Figure 1: Zebra Mussels (*Dreissena polymorpha*)

al., 1997). This small invasive mussel has caused many problems as it continues to invade the waters of Wisconsin.

This thumbnail sized mussel has the potential to change aquatic ecosystems. Zebra mussels are filter feeders and can filter up to one liter of water each day, removing phytoplankton and small zooplankton. By removing significant amounts of phytoplankton from the water, zebra mussels reduce the food source for microscopic zooplankton which make of a large portion of the diet of many juvenile fishes and forage fish. (Hilgendorf et al. 1997)

Native North American mussel populations in many lakes and rivers are being out competed by these prolific invaders. In many cases native mussels are found encrusted by zebra mussels. As zebra mussels spread, biologists are concerned that the populations of native mussels are declining and perhaps some of the rare species may be completely eliminated (Hilgendorf et al., 1997).

Zebra mussels have caused major economic problems in the Great Lakes regions. Zebra mussels have encrusted and clogged water intake pipes, such as the ones used for power plants and municipal water treatment plants causing reduction in pumping capabilities and occasional shutdowns (Hilgendorf et al., 1997). Hundreds of thousands of dollars are spent by each plant yearly to remove and control zebra mussels.

Recreation-based industries are another place were we see the impacts of zebra mussels in Wisconsin. Unprotected docks, breakwalls, boat bottoms, and engine outdrives can be colonized. There have been some reports of boat engines overheating due to the colonies of zebra mussels clogging cooling water inlets and mussel colonization of boat hulls (Hilgendorf et al., 1997).

The problems caused by zebra mussels and other aquatic exotics in Wisconsin raises many concerns for the future of Wisconsin's waters. A law that took effect with the May 2002 fishing opener, prohibits the launching of a watercraft into any navigable waters of Wisconsin if the person launching has reason to believe that aquatic plants could be attached to the watercraft and/or trailer (Statute 30.715).

The Department of Natural Resources was subsequently allocated money to conduct monitoring and watercraft inspections, as well as to provide education/outreach to help reduce the spread of aquatic invasive species. The DNR, UW Sea Grant, UW-

Extension, and US Fish and Wildlife, as well as local lake groups, have all provided information and education to the public about exotic species including zebra mussels to help reduce the spread of invasive species in Wisconsin. Boat launches are posted with signs and staff are making efforts to reach as many landings as possible to educate boaters on precautions they should take to prevent the spread of aquatic invasive species.

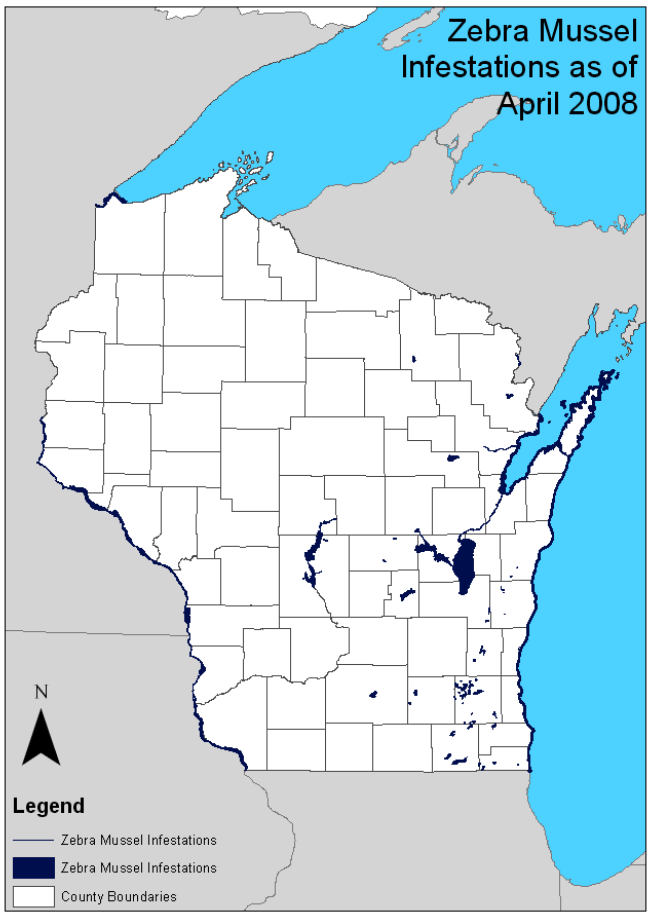

Figure 2: Zebra Mussel distribution in Wisconsin

One of the efforts of the Department is to monitor the spread and infestations of aquatic invasive species throughout Wisconsin. The infestation of the invasive plant, Eurasian Water Milfoil has been monitored since the 1960's in Wisconsin. In autumn of 2003 the Department started to monitor and map the presence of the invasive rusty crayfish in the waters of Wisconsin. Due to the concern regarding zebra mussels, DNR staff monitor lakes and rivers for the presence of zebra mussels in both adult and larval form (veligers). The Wisconsin Zebra Mussel Watch started documenting the expansion of the zebra mussels in 1990 in the Great Lakes and some of Wisconsin's inland waters. As of April 2008, the zebra mussel's range includes Lake Michigan, Lake Superior, many tributaries to Lakes Michigan and Superior, the Mississippi River, the Lower St. Croix, the St. Louis River from the Wisconsin-Minnesota boundary to the Duluth Superior Harbor, along with 86 Wisconsin inland lakes in 34 counties and 18 streams/rivers. The Department continues to monitor the spread of zebra mussels in Wisconsin inland lakes and rivers.

Zebra mussel veliger sampling conducted throughout the state of Wisconsin during 2008 resulted in the examination of 1048 samples collected from 197 of Wisconsin's inland lakes and 7 rivers, and creeks in 42 counties. There were also 12 samples monitored from 5 lakes in 2 Michigan counties. These lakes were tested because of their proximity and potential connection to Wisconsin water bodies.

METHODS

Field Procedures

A total of 197 of Wisconsin's lakes and 7 rivers and creeks were monitored along with 5 Michigan lakes for the larval form (veligers) of zebra mussels in the 2008-sampling season. Veliger sampling provides a better method for early detection of zebra mussels than monitoring for adults. Department staff selected lakes to sample based on boat traffic, proximity to zebra mussel infested waters, and the recommendations of local resource mangers. The lakes in Michigan were selected due to their proximity and potential connection to Wisconsin waterways. In most cases, three samples were taken from each lake on three dates between the months of June and September, as this is when most zebra mussel reproduction takes place. On each sampling date, veliger samples were collected from three sites to provide broad spatial coverage of the lake. Most of the lakes were sampled at the same locations three times during the collection season. Some lakes were sampled less often and at fewer sites. The veliger field sampling was done with a 64-micron mesh, 0.5 meter diameter plankton net (Figure 3). The plankton net was slowly lowered two meters into the water at the three pre-selected sites on each lake. The net was then pulled up vertically (Figure 4). The length of the tow was recorded. Care was taken to pull the net up slowly enough so that a pressure wave was not created at the opening surface of the

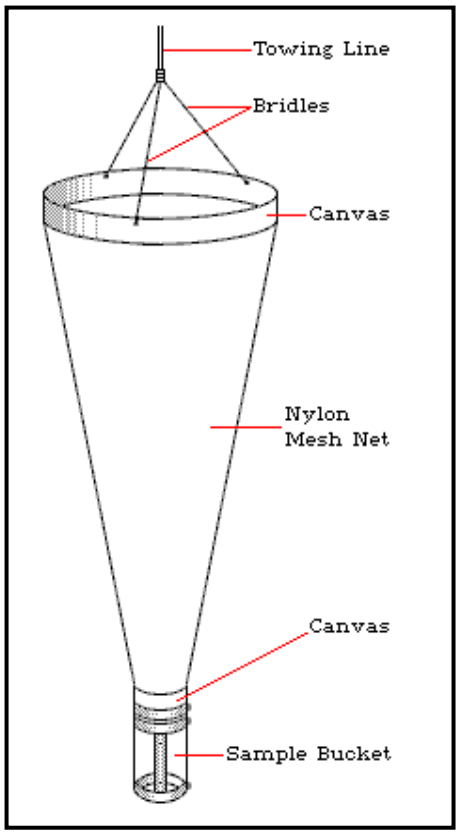

Figure 3: Standard Plankton Net

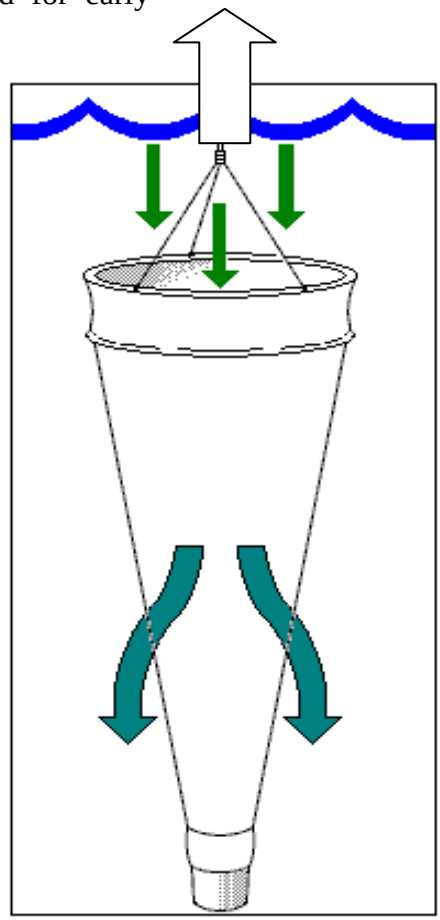

Figure 4: As net is pulled up vertically, water is expelled out of the nylon mesh net

net assuring that an accurate water column sample was taken. Veliger sampling procedures varied somewhat depending on the lake type and conditions. On shallow lakes where it was impractical to do a vertical tow, a horizontal sample was collected at mid-depth. Oligotrophic lakes were sampled with two (two-meter) tows and consolidated into one collection bottle for each site. The sample size was reduced to one-two meter tows in eutrophic lakes. Filtering out as much water through the sample bucket as possible in the field was required to condense the size of the sample. In all cases the volume of water sampled was recorded. All samples were preserved in the field with four parts 95% isopropyl alcohol to one part sample.

To prevent cross contamination and reduce the risk of spread of aquatic invasive species, plankton nets and other sampling gear were rinsed in vinegar between lakes. Boats were power-washed, bleached or dried for a sufficient time to prevent zebra mussels or other aquatic invasive species from being spread by the collectors.

Lab Procedures

To analyze each of the 1060 samples 3 sets of 10-ml sample was withdrawn with a pipette directly from the material settled on the bottom of the sample bottle. The sample in the Petri dish is used to determine presence or absence of veligers in each sample. The sample in the Petri dish was examined using a dissecting microscope equipped with cross-polarized light filter. (Figure 5) The cross-polarized light filter was used because the shells of veligers contain a crystalline calcite material that will reflect light. The portions of the shell that are on the axes of the cross-polarized light are unable to reflect the light causing the veligers to appear to have a "cross" or and "X" on them allowing them to be easily detected (Johnson 1995). However, other invertebrates also posses this indicator (e.g. Ostracoda), and have similar shapes during some life stages (e.g. Cladocera), necessitating additional bright-field microscopy under higher magnification. The organisms with similar shape to the zebra mussel veliger, or that possess the same indicators as the zebra mussel veliger under cross-polarized light, are discussed in

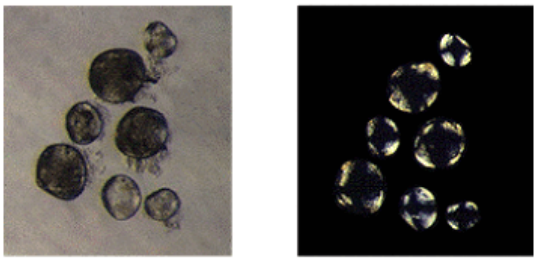

Figure 5: Left – veligers as seen with bright-field; Right – veligers as seen with cross-polarized light

Appendix 1. Initial examination for the presence of zebra mussel veligers was done using this method. At least two-10 ml sub-samples were examined when making the determination of presence or absence of veligers. Equipment was cleaned between each examination to insure that samples were not cross-contaminated.

Positive identification of veligers is done with the 1-ml sample in the Sedgwick-Rafter Cell (Figure 6) under bright field with the compound microscope. Zebra mussel veligers range from 60 μm as a trochophore, to just over 100 μm as a D-shaped veliger and up to 250-300 μm as a post-veliger just before they settle out of the water column (Nalepa and Schloesser 1993). The examination for veligers was typically done under 40X magnification. Veligers were distinguished from other organisms by examining them under higher magnification and by obtaining different views. When veligers were observed to be present, the sample was returned to the original sample container for enumeration.

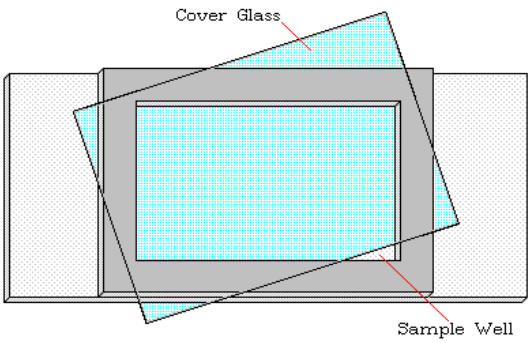

Figure 6: Sedgwick – Rafter Cell

Enumeration was determined by using the Sedgwick-Rafter Cell and a grid to count the number of veligers present in 1-ml aliquots. To determine this, the original sample was agitated gently to distribute the veligers throughout the sample. One milliliter was withdrawn from the center of the sample container and placed on the Sedgwick-Rafter Cell and examined under the compound microscope. Individual zebra mussel veligers were then counted on the slide. A total of 10 sub-samples were retrieved and counted for each positive lake sample. The numbers of veligers per cubic meter were determined following the procedure adapted from Wetzel and Likens (1979) shown below.

Volume filtered from plankton tow:

$$Vf = (A)\ (D)$$

Where:

A = area of plankton net mouth, $\mathbf{A = (\pi * (r/2)^2)}$

r = radius of plankton net in meters

L = length of tow in meters

Vf = volume of lake water filtered in liters

Example: If r = 0.5m and D = 4m **then:**

Vf = $(\pi * (0.5/2)^2)\ (4)$ = $\mathbf{0.785 m^3 * 1000 = 785}$ **liters**

Quantitative enumeration of zebra mussel veligers using Sedgwick-Rafter Cells:

$$n = \frac{[N\ (1000)\ Vs]}{Vf}$$

Where:

Vs = volume of sample in liters (sum of 1 ml aliquots)

N = average number of veligers per cell +/- standard deviation (S.D.) of the mean

Vf = volume of lake water filtered in liters

n = number of veliger per liter

Example: If five –1ml aliquots Sedgwick Rafter cell are examined resulting in 3, 5, 2, 4, 7 veligers per 1ml cell, **then:**

Vs = 0.005 liters

N = 4.2 per ml (S.D. = 1.9)

Vf = 785 liters

$$\mathbf{n} = \frac{[4.2\ (1000)\ 0.005]}{785}$$

n = **0.027 veligers per liter** OR **n** = **27 veligers per** $\mathbf{m^3}$; **(+/- 12 veligers/**$\mathbf{m^3}$**)**

All lab samples were analyzed by Department staff except for samples collected from the Beaver Creek Reserve. These samples are listed as the BCR region and were analyzed by Beaver Creek Reserve staff.

RESULTS

The zebra mussel veliger sampling conducted throughout the state of Wisconsin during 2008 resulted in 1048 samples from 197 Wisconsin lakes in 42 counties. 12 samples were also collected in 5 lakes from 2 Michigan counties. The results of the zebra mussel veligers analysis for 2008 are shown in Table 1. Of the 1060 samples, zebra mussel veligers were not detected in 1020 samples. Six lakes and one river, representing 40 individual samples, tested positive for zebra mussel veligers. There was also an unconfirmed report of adult zebra mussels in an additional lake.

The six lakes that were found to have zebra mussel veligers during the 2008 sampling season are shown in Tables 1 and 2. Information on the river which tested positive can be found in Appendix 4.

Table 1: Lakes on the infested list based on 2008 data

Lake	County	Sample Date	Average Number of Zebra Mussel Veligers
Clark Lake	Door	6/25/08	314,315
Kangaroo Lake	Door	6/4/08	318
Tichigan Lake	Racine	6/27/08, 7/26/08	2,335; 1,696
Potters Lake	Walworth	7/19/08, 7/31/08, 8/23/08	42.3; 297; 509
Ashippun Lake	Waukesha	6/28/08, 7/13/08	63,338; 13,457
Denoon Lake	Waukesha	9/22/08	129.5

Table 2: Lakes to be added to or remain on the watch list based on 2008 data

Lake	County	Sample Date	Average Number of Zebra Mussel Veligers
Lake Emily	Dodge	Citizen Report	-
Kangaroo[§]	Door	6/4/08	318

[§] Also on the 2007 Watch List

Table 3: Lake listing for zebra mussels

Lake Name	2007 Field Season	2008 Field Season
Ashippun Lake	Presence	Presence
Clark Lake	Presence	Presence
Denoon Lake	Unlisted	Presence
Kangaroo Lake	Watch	Watch
Potters Lake	Unlisted	Presence
Tichigan Lake	Watch	Presence
Wolf River Pond	Watch	Watch

Of the six lakes that tested positive for veligers, two were previously confirmed as having a reproducing population of zebra mussels and were included on the Statewide Zebra Mussel Presence in Wisconsin Waters list (version 4/08). Testing was continued on these lakes to look for different age classes and densities of reproducing populations.

Of the six lakes that tested positive for veligers, two of the lakes were on the statewide watch list (version 2/07) including Kangaroo Lake and Tichigan Lake. Follow-up monitoring confirmed that Tichigan Lake had a reproducing population of zebra mussel adults. Kangaroo Lake still tested positive for veligers but no adult zebra mussels were found in this lake.

Two lakes tested positive which were not previously known to have had veligers and/or adult zebra mussels present. These include: Denoon Lake and Potters Lake. Based on this season's data Denoon Lake and Potters Lakes have been placed on the Zebra Mussel Presence in Wisconsin Waters list. As a result of the 2008 DNR sampling for veligers, three lakes are being added to the list of infested waters. These waters are listed in Table 1. The complete list of affected waterways can be found in Appendix 2.

Kangaroo Lake tested positive for veligers. The number of veligers in these samples was low and adults have not been confirmed. This lake will remain on the 2008 Zebra Mussel Watch List. Lake Emily in Dodge County has been added to the 2008 Watch List. A report of adult zebra mussels in this lake was received late in the 2008 sampling season from a professional consultant. At this time the report has not been confirmed by Department staff as the samples were not vouchered due to the timing of the report, sampling will not be possible until the 2009 sampling season. This lake was not scheduled to be sampled for veligers in the 2008 season. At this time veliger samples have not been taken to assess presence in this lake and adult presence has not been confirmed or size classes determined. As a result Lake Emily was placed on the 2008 Zebra Mussel Watch List.

CONCLUSIONS AND RECOMENDATIONS

The Department of Natural Resources, Great Lakes Indian Fish and Wildlife Commission, National Park Service, and University of Wisconsin Madison monitored 197 lakes and 7 rivers and creeks for zebra mussel veligers throughout the state for a total of 1048 samples. 12 samples were also collected in 5 lakes from 2 Michigan counties. Zebra mussel veligers were observed in six of the 202 lakes sampled in Wisconsin and Michigan during 2008. These six lakes are: Ashippun Lake, Clark Lake, Denoon Lake, Kangaroo Lake, Potters Lake, and Tichigan Lake. Prior to the 2008-sampling season zebra mussels had not been found in Denoon Lake and Potters Lake. Both of these lakes will be placed on the 2008 Zebra Mussel Presence in Wisconsin Waters List (Appendix 2). The other lake that tested positive for veligers is Kangaroo Lake, however adults were not confirmed so this lake will stay on the Zebra Mussel Watch List for 2008 (Appendix 3). Lake Tichigan was moved from the Zebra Mussel Watch List to the Zebra Mussel Presence list (Appendix 2). Clark Lake and Ashippun Lake both were known to be infested at the start of the 2008 season but were tested to gain more information about age classes and densities of reproducing populations.

Denoon Lake, Potters Lake and Tichigan Lake have been added to the Zebra Mussel Presence in Wisconsin Waters list due to discovery of adult zebra mussels of different age classes and positive veliger results which qualifies these lakes to be on the aforementioned list.

From the results of past sampling seasons we recommended additional veliger testing next sampling season, this sampling should include three veliger sampling dates with three samples taken along with observation for adult zebra mussels. Based on the results of this monitoring lakes should be considered for inclusion on the Zebra Mussel Presence in Wisconsin Waters statewide list by working with each region's water quality biologists.

The lakes recommended for additional testing are:

Lake Name	County	Watch Listing
• Wingra Lake	Dane County	Veligers only (2003)
• Kangaroo Lake	Door County	Veligers only (‘05, ‘07, ‘08)
• Brule River Flowage	Florence County	Veligers only (2006)
• Outlet Creek	Forest County	Adults only (2006)
• Round Lake	Sawyer County	Veligers only (2004)
• Wolf River Pond	Shawano County	Veligers only (2007)
• Big Lake	Vilas County	Veligers only (2003)
• Gilmore Lake	Washburn County	Veligers only (2005)
• Columbia Lake	Waupaca County	Veligers only (2001)
• Long Lake	Waupaca County	2001
• Partridge Crop	Waupaca County	2001
• Round Lake	Waupaca County	Veligers only (2001)
• Long Lake	Waushara County	Veligers only (2002)

In addition to monitoring of the lakes mentioned above, priority will be given to sampling lakes/streams that are hydraulically connected or adjacent to lakes with zebra mussel present to evaluate whether the zebra mussels are expanding their range into those waters. Limited monitoring will occur on some lakes that were tested in the past that remain unaffected.

Table 4: Results of all lakes tested in Wisconsin for zebra mussel veligers in 2008 by county.

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Big Roche A Cri Lake	1374800	Adams	Kitter	WCR	07/21/08	2	-,-
Camelot Lake	1378100	Adams	Kitter	WCR	06/18/08	3	-,-,-
Camelot Lake	1378100	Adams	Kitter	WCR	08/18/08	3	-,-,-
Friendship Lake	1352000	Adams	Kitter	WCR	07/21/08	1	-
Mason Lake	175700	Adams / Marquette	Henneman / Dowd	SCR	07/02/08	3	-,-,-
Mason Lake	175700	Adams / Marquette	Henneman / Dowd	SCR	08/25/08	3	-,-,-
Mason Lake	175700	Adams/ Marquette	Henneman / Dowd	SCR	08/06/08	3	-,-,-
Sherwood Lake	1377900	Adams	Kitter	WCR	06/18/08	3	-,-,-
Sherwood Lake	1377900	Adams	Kitter	WCR	08/18/08	3	-,-,-
Butternut Lake*	2283300	Ashland / Price	Olson / Quagon	NOR	06/24/08	3	-,-,-
Butternut Lake*	2283300	Ashland / Price	Olson / Quagon	NOR	08/11/08	3	-,-,-
Day Lake*	2430300	Ashland	Olson / Quagon	NOR	07/02/08	2	-,-
Day Lake*	2430300	Ashland	Olson / Quagon	NOR	08/06/08	2	-,-
Galilee Lake*	2935500	Ashland	Olson / Quagon	NOR	07/01/08	2	-,-
Gordon Lake*	2406500	Ashland	Olson / Quagon	NOR	06/30/08	3	-,-,-
Mineral Lake*	2916900	Ashland	Olson / Quagon	NOR	07/01/08	3	-,-,-
Mineral Lake*	2916900	Ashland	Quagon / Falck	NOR	08/07/08	3	-,-,-
Beaufort Lake *	Michigan	Baraga	Olson / Quagon	Mich.	07/15/08	3	-,-,-
Big Lake*	Michigan	Baraga	Olson / Quagon	Mich.	07/17/08	2	-,-
Pickett Lake *	Michigan	Baraga / Houghton	Olson / Quagon	Mich.	07/16/08	3	-,-,-
Parent Lake*	Michigan	Baraga	Olson / Quagon	Mich.	07/16/08	1	-
Lower Turtle Lake	2079700	Barron	Larson	NOR	07/25/08	3	-,-,-
Red Cedar Lake	2109600	Barron	Larson	NOR	07/21/08	3	-,-,-
Red Cedar Lake	2109600	Barron	Larsen	NOR	08/18/08	3	-,-,-
Rice Lake	2103900	Barron	Heuschele / Brady	BCR	06/25/08	3	-,-,-
Rice Lake	2103900	Barron	Heuschele / Brady	BCR	07/21/08	3	-,-,-
Rice Lake	2103900	Barron	Heuschele / Brady	BCR	08/13/08	3	-,-,-
Atkins Lake*	2734000	Bayfield	Olson / Quagon	NOR	07/03/08	3	-,-,-
Atkins Lake*	2734000	Bayfield	Olson / Quagon	NOR	08/04/08	3	-,-,-

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Big Sand*	2676800	Burnett	Olson / Quagon	NOR	06/10/08	3	-,-,-
Big Sand*	2676800	Burnett	Olson / Quagon	NOR	07/22/08	3	-,-,-
Big Trade Lake	2638700	Burnett	Larson	NOR	07/09/08	3	-,-,-
Big Trade Lake	2638700	Burnett	Larsen	NOR	08/14/08	3	-,-,-
Devils Lake*	2461100	Burnett	Olson / Quagon	NOR	06/12/08	3	-,-,-
Devils Lake*	2495100	Burnett	Olson / Quagon	NOR	07/23/08	3	-,-,-
Little Trade Lake	2639300	Burnett	Larson	NOR	07/09/08	1	-
Little Trade Lake	2639300	Burnett	Larsen	NOR	08/14/08	1	-
Long Lake	2674100	Burnett	Larsen	NOR	08/25/08	3	-,-,-
Long Lake	2674100	Burnett	Larson	NOR	07/26/08	3	-,-,-
Middle McKenzie*	2706500	Burnett	Olson / Quagon	NOR	07/21/08	3	-,-,-
Middle McKenzie*	2706500	Burnett / Washburn	Olson / Quagon	NOR	06/09/08	3	-,-,-
Sand Lake *	2495100	Burnett	Olson / Quagon	NOR	07/22/08	3	-,-,-
Sand Lake *	2495100	Burnett	Olson / Quagon	NOR	06/11/08	3	-,-,-
Axehandle Lake	2092500	Chippewa	Heuschele / Brady	BCR	06/10/08	2	-,-
Axehandle Lake	2092500	Chippewa	Heuschele / Brady	BCR	07/07/08	2	-,-
Axehandle Lake	2092500	Chippewa	Heuschele / Brady	BCR	07/31/08	2	-,-
Dark Lake (Sampson West)	2092700	Chippewa	Heuschele / Brady	BCR	06/10/08	1	-
Dark Lake (Sampson West)	2092700	Chippewa	Heuschele / Brady	BCR	07/07/08	1	-
Dark Lake (Sampson West)	2092700	Chippewa	Heuschele / Brady	BCR	07/31/08	1	-
Hemlock Lake	1853400	Chippewa	Heuschele / Brady	BCR	06/24/08	2	-,-
Hemlock Lake	1853400	Chippewa	Heuschele / Brady	BCR	07/28/08	2	-,-
Hemlock Lake	1853400	Chippewa	Heuschele / Brady	BCR	08/11/08	2	-,-
Henneman Lake	2352500	Chippewa	Heuschele / Brady	BCR	06/24/08	2	-,-
Henneman Lake	2352500	Chippewa	Heuschele / Brady	BCR	07/16/08	2	-,-
Henneman Lake	2352500	Chippewa	Heuschele / Brady	BCR	08/07/08	2	-,-
Horseshoe Lake	1854300	Chippewa	Heuschele / Brady	BCR	06/23/08	2	-,-
Horseshoe Lake	1854300	Chippewa	Heuschele / Brady	BCR	07/17/08	2	-,-
Horseshoe Lake	1854300	Chippewa	Heuschele / Brady	BCR	08/07/08	2	-,-
Lake Como (Bloomer Mill Pond)	2152100	Chippewa	Heuschele / Brady	BCR	06/25/08	2	-,-
Lake Como (Bloomer Mill Pond)	2152100	Chippewa	Heuschele / Brady	BCR	07/21/08	2	-,-
Lake Como (Bloomer Mill Pond)	2152100	Chippewa	Heuschele / Brady	BCR	08/13/08	2	-,-
Loon Lake	1863000	Chippewa	Heuschele / Brady	BCR	06/15/08	2	-,-
Loon Lake	1863000	Chippewa	Heuschele / Brady	BCR	07/07/08	2	-,-
Loon Lake	1863000	Chippewa	Heuschele / Brady	BCR	07/21/08	2	-,-

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Marsh-Miller Lake	2171200	Chippewa	Heuschele / Brady	BCR	06/05/08	3	-,-,-
Marsh-Miller Lake	2171200	Chippewa	Heuschele / Brady	BCR	07/28/08	3	-,-,-
Marsh-Miller Lake	2171200	Chippewa	Heuschele / Brady	BCR	08/11/08	3	-,-,-
Otter Lake (FL Browns Lake)	2157000	Chippewa	Heuschele / Brady	BCR	06/03/08	3	-,-,-
Otter Lake (FL Browns Lake)	2157000	Chippewa	Heuschele / Brady	BCR	07/09/08	3	-,-,-
Otter Lake (FL Browns Lake)	2157000	Chippewa	Heuschele / Brady	BCR	08/04/08	3	-,-,-
Plummer Lake	2348700	Chippewa	Heuschele / Brady	BCR	06/22/08	2	-,-
Plummer Lake	2348700	Chippewa	Heuschele / Brady	BCR	07/17/08	2	-,-
Plummer Lake	2348700	Chippewa	Heuschele / Brady	BCR	08/07/08	2	-,-
Rock Lake	2171600	Chippewa	Heuschele / Brady	BCR	06/05/08	3	-,-,-
Rock Lake	2171600	Chippewa	Heuschele / Brady	BCR	08/11/08	3	-,-,-
Round Lake	2169200	Chippewa	Heuschele / Brady	BCR	06/15/08	2	-,-
Round Lake	2169200	Chippewa	Heuschele / Brady	BCR	07/07/08	2	-,-
Round Lake	2169200	Chippewa	Heuschele / Brady	BCR	07/31/08	2	-,-
North Shattuck Lake	1869300	Chippewa	Heuschele / Brady	BCR	06/24/08	2	-,-
North Shattuck Lake	1869300	Chippewa	Heuschele / Brady	BCR	07/17/08	2	-,-
North Shattuck Lake	1869300	Chippewa	Heuschele / Brady	BCR	08/11/08	2	-,-
South Shattuck Lake	1879300	Chippewa	Heuschele / Brady	BCR	06/18/08	2	-,-
South Shattuck Lake	1879300	Chippewa	Heuschele / Brady	BCR	07/17/08	2	-,-
South Shattuck Lake	1879300	Chippewa	Heuschele / Brady	BCR	08/11/08	2	-,-
Town Line Lake	2172600	Chippewa	Heuschele / Brady	BCR	06/23/08	2	-,-
Town Line Lake	2172600	Chippewa	Heuschele / Brady	BCR	07/17/08	2	-,-
Town Line Lake	2172600	Chippewa	Heuschele / Brady	BCR	08/07/08	2	-,-
Two Island Lake	1887500	Chippewa	Heuschele / Brady	BCR	05/25/08	2	-,-
Two Island Lake	1887500	Chippewa	Heuschele / Brady	BCR	07/28/08	2	-,-
Two Island Lake	1887500	Chippewa	Heuschele / Brady	BCR	08/13/08	2	-,-
Crystal Lake	978900	Dane	Henneman / Dowd	SCR	06/30/08	3	-,-,-
Crystal Lake	978900	Dane	Henneman / Dowd	SCR	07/30/08	3	-,-,-
Crystal Lake	978900	Dane	Henneman / Dowd	SCR	08/20/08	3	-,-,-
Fish Lake	985100	Dane	Bier	SCR	08/13/08	3	-,-,-
Lake Kegonsa	802600	Dane	Bier	SCR	08/06/08	3	-,-,-
Lake Mendota	805400	Dane	Bier	SCR	07/30/08	3	-,-,-
Lake Monona	804600	Dane	Bier	SCR	07/30/08	3	-,-,-
Indian Lake	1249000	Dane	Henneman / Dowd	SCR	06/30/08	3	-,-,-
Indian Lake	1249000	Dane	Henneman / Dowd	SCR	07/30/08	3	-,-,-
Indian Lake	1249000	Dane	Henneman / Dowd	SCR	08/20/08	2	-,-
Lake Waubesa	803700	Dane	Bier	SCR	08/06/08	3	-,-,-

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Wingra Lake	805000	Dane	Henneman / Dowd	SCR	06/25/08	3	-,-,-
Wingra Lake	805000	Dane	Bier	SCR	08/06/08	3	-,-,-
Clark Lake	97700	Door	Gansberg	NER	06/25/08	2	+,+
Europe Lake	93100	Door	Coady	NER	06/09/08	3	-,-,-
Kangaroo Lake	98600	Door	Coady	NER	06/04/08	3	+,-,+
Eau Galle Lake	2056600	Dunn	Heuschele / Brady	BCR	06/04/08	2	-,-
Eau Galle Lake	2056600	Dunn	Heuschele / Brady	BCR	07/10/08	2	-,-
Eau Galle Lake	2056600	Dunn	Heuschele / Brady	BCR	08/18/08	2	-,-
Elk Creek Lake	2121000	Dunn	Heuschele / Brady	BCR	06/04/08	1	-
Elk Creek Lake	2121000	Dunn	Heuschele / Brady	BCR	08/05/08	1	-
Coon Lake (FL)	2135600	Eau Claire	Heuschele / Brady	BCR	06/02/08	2	-,-
Coon Lake (FL)	2135600	Eau Claire	Heuschele / Brady	BCR	07/23/08	2	-,-
Coon Lake (FL)	2135600	Eau Claire	Heuschele / Brady	BCR	08/04/08	2	-,-
Dells Pond	2149900	Eau Claire	Heuschele / Brady	BCR	06/09/08	2	-,-
Dells Pond	2149900	Eau Claire	Heuschele / Brady	BCR	07/23/08	2	-,-
Dells Pond	2149900	Eau Claire	Heuschele / Brady	BCR	08/05/08	2	-,-
Fall Creek Pond	2130100	Eau Claire	Heuschele / Brady	BCR	06/02/08	2	-,-
Fall Creek Pond	2130100	Eau Claire	Heuschele / Brady	BCR	07/23/08	2	-,-
Fall Creek Pond	2130100	Eau Claire	Heuschele / Brady	BCR	08/04/08	2	-,-
Brule R. Flowage	704400	Florence	McLaughlin/Pallardy	NOR	08/05/08	3	-,-,-
Ellwood Lake	650500	Florence	Heath (Onterra)	NOR	06/30/08	1	-
Ellwood Lake	650500	Florence	Butterfield (Onterra)	NOR	08/18/08	1	-
Emily Lake	651600	Florence	McLaughlin/Pallardy	NOR	08/05/08	1	-
Fisher Lake	704200	Florence	McLaughlin/Pallardy	NOR	08/05/08	1	-
Lake Halsey	679300	Florence	McLaughlin/Pallardy	NOR	06/17/08	3	-,-,-
Keyes Lake	672900	Florence	Watch / Pallardy	NOR	08/13/08	1	-
Long Lake	677400	Florence	McLaughlin/Pallardy	NOR	07/22/08	3	-,-,-
Long Lake	677400	Florence	McLaughlin/Pallardy	NOR	08/19/08	3	-,-,-
Lost Lake	588000	Florence	Watch / Pallardy	NOR	08/13/08	1	-
Patten Lake	653700	Florence	Watch / Pallardy	NOR	08/13/08	1	-
Arbutus Lake	181400	Forest	Heath (Onterra)	NOR	06/17/08	1	-
Arbutus Lake	181400	Forest	Butterfield (Onterra)	NOR	08/18/08	1	-
Butternut Lake	692400	Forest	McLaughlin/Pallardy	NOR	06/17/08	3	-,-,-
Butternut Lake	692400	Forest	McLaughlin/Pallardy	NOR	07/22/08	3	-,-,-
Butternut Lake	692400	Forest	McLaughlin/Pallardy	NOR	08/19/08	3	-,-,-
Pine Lake	406900	Forest	McLaughlin/Pallardy	NOR	07/16/08	1	-

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Silver Lake	555700	Forest	McLaughlin/Pallardy	NOR	07/16/08	1	-
Wabikon Lake	556900	Forest	McLaughlin/Pallardy	NOR	07/16/08	1	-
Windfall Lake	373500	Forest	Butterfield (Onterra)	NOR	07/14/08	1	-
Windfall Lake	373500	Forest	Butterfield (Onterra)	NOR	08/18/08	1	-
Otter Lake *	Michigan	Houghton	Olson / Quagon	Mich.	07/14/08	3	-,-,-
Mercer Lake	2313600	Iron	Wallace	NOR	06/20/08	3	-,-,-
Turtle Flambeau	2294900	Iron	Wallace	NOR	08/13/08	3	-,-,-
Upson Lake*	2908500	Iron	Olson / Quagon	NOR	07/01/08	1	-
Upson Lake*	2908500	Iron	Olson / Quagon	NOR	08/05/08	1	-
Paddock Lake	737900	Kenosha	Berg / Harris	SER	07/19/08	3	-,-,-
Paddock Lake	737900	Kenosha	Berg / Harris	SER	08/14/08	3	-,-,-
East Alaska Lake	94200	Kewaunee	Coady	NER	06/10/08	3	-,-,-
Heidmann Lake	85200	Kewaunee	Coady	NER	07/23/08	3	-,-,-
West Alaska Lake	94300	Kewaunee	Coady	NER	06/10/08	3	-,-,-
Yellowstone Lake	903700	Lafayette	Henneman / Dowd	SCR	08/11/08	3	-,-,-
Yellowstone Lake	903700	Lafayette	Henneman / Dowd	SCR	08/27/08	3	-,-,-
Enterprise Lake	1579700	Langlade	McLaughlin/Pallardy	NOR	06/19/08	3	-,-,-
Enterprise Lake	1579700	Langlade	McLaughlin/Pallardy	NOR	07/24/08	3	-,-,-
Enterprise Lake	1579700	Langlade	McLaughlin/Pallardy	NOR	08/19/08	3	-,-,-
Otter Lake	387200	Langlade	McLaughlin/Pallardy	NOR	07/08/08	1	-
Rose Lake	494200	Langlade	McLaughlin/Pallardy	NOR	07/08/08	1	-
Rolling Stone Lake	389300	Langlade	Watch / Wickman	NOR	08/11/08	1	-
Sawyer Lake	198100	Langlade	McLaughlin/Pallardy	NOR	07/08/08	1	-
Lake Alice	1555900	Lincoln	McLaughlin/Pallardy	NOR	06/18/08	3	-,-,-
Lake Alice	1555900	Lincoln	McLaughlin/Pallardy	NOR	07/23/08	3	-,-,-
Lake Alice	1555900	Lincoln	McLaughlin/Pallardy	NOR	08/18/08	3	-,-,-
Deer Lake	1519600	Lincoln	Heath (Onterra)	NOR	07/01/08	1	-
Deer Lake	1519600	Lincoln	Butterfield (Onterra)	NOR	07/19/08	1	-
Muskellunge Lake	1595600	Lincoln	Butterfield (Onterra)	NOR	07/17/08	1	-
Muskellunge Lake	1595600	Lincoln	Butterfield (Onterra)	NOR	08/19/08	1	-
Pesobic Lake	1481600	Lincoln	McLaughlin/Pallardy	NOR	06/23/08	1	-
Spirit River Flowage	1506800	Lincoln	McLaughlin/Pallardy	NOR	06/23/08	1	-
Tug Lake	1482400	Lincoln	McLaughlin/Pallardy	NOR	06/23/08	1	-

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Bullhead Lake	68300	Manitowoc	Coady	NER	07/08/08	3	-,-,-
Carstens Lake	66800	Manitowoc	Coady	NER	07/22/08	3	-,-,-
Harpt Lake	84600	Manitowoc	Coady	NER	07/23/08	3	-,-,-
Horseshoe Lake	64200	Manitowoc	Coady	NER	08/05/08	3	-,-,-
Long Lake	77500	Manitowoc	Coady	NER	07/01/08	3	-,-,-
Silver Lake	67400	Manitowoc	Gansberg	NER	07/09/08	1	-
Silver Lake	67400	Manitowoc	Gansberg	NER	09/03/08	2	-,-
Tuma Lake	87900	Manitowoc	Coady	NER	07/23/08	3	-,-,-
Wilke Lake	58000	Manitowoc	Coady	NER	07/22/08	3	-,-,-
Mayflower Lake	310500	Marathon	Kitter	WCR	07/24/08	2	-,-
Mission Lake	1005400	Marathon	Kitter	WCR	06/24/08	2	-,-
Mosinee Flowage	1434900	Marathon	Kitter	WCR	06/25/08	2	-,-
Pike Lake	1406300	Marathon	Kitter	WCR	07/24/08	2	-,-
Pike Lake	1406300	Marathon	Kitter	WCR	08/21/08	2	-,-
Lake Wausau	1437500	Marathon	Kitter	WCR	06/25/08	3	-,-,-
Lake Wausau	1437500	Marathon	Kitter	WCR	09/06/08	3	-,-,-
Caldron Falls Res.	545400	Marinette	Coady	NER	06/26/08	3	-,-,-
High Falls Res.	540600	Marinette	Coady	NER	06/26/08	3	-,-,-
Lily Lake	619800	Marinette	Coady	NER	08/13/08	3	-,-,-
Lost Lake	587900	Marinette	Coady	NER	06/05/08	3	-,-,-
Montana Lake	518300	Marinette	Coady	NER	08/04/08	3	-,-,-
Pywaosit Lake	341000	Menominee	Pyatskowit	NER	07/23/08	3	-,-,-
Watosah Lake	339800	Menominee	Pyatskowit	NER	07/23/08	3	-,-,-
Berry Lake	418300	Oconto	Nordin	NER	08/28/08	3	-,-,-
Berry Lake	418300	Oconto	Ewart	NER	10/10/08	1	-
Boot Lake	418700	Oconto	Coady	NER	08/06/08	3	-,-,-
Chute Pond	462520	Oconto	Coady / Nordin	NER	06/03/08	3	-,-,-
Chute Pond	462520	Oconto	Reyburn	NER	07/08/08	3	-,-,-
Chute Pond	462520	Oconto	Reyburn	NER	07/08/08	3	-,-,-
Kelly Lake	446600	Oconto	Coady	NER	08/04/08	3	-,-,-
Linzy Creek	453400	Oconto	Nordin	NER	08/28/08	1	-
Rost Lake	504300	Oconto	Coady	NER	08/04/08	2	-,-
Wheeler Lake	439800	Oconto	Coady	NER	08/06/08	3	-,-,-

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Buffalo Lake	974200	Oneida	McLaughlin/Pallardy	NOR	07/28/08	1	-
Crescent Lake	1564200	Oneida	McLaughlin/Pallardy	NOR	06/18/08	3	-,-,-
Crescent Lake	1564200	Oneida	McLaughlin/Pallardy	NOR	07/23/08	3	-,-,-
Crescent Lake	1564200	Oneida	McLaughlin/Pallardy	NOR	08/15/08	3	-,-,-
Franklin Lake	986000	Oneida	McLaughlin / Watch	NOR	08/12/08	1	-
Kathan Lake	1598300	Oneida	Heath (Onterra)	NOR	06/30/08	1	-
Kathan Lake	1598300	Oneida	Butterfield (Onterra)	NOR	08/19/08	1	-
Mid Lake	1542600	Oneida	Heath (Onterra)	NOR	06/19/08	1	-
Mid Lake	1542600	Oneida	Butterfield (Onterra)	NOR	08/18/08	1	-
Minocqua Lake	1542400	Oneida	McLaughlin / Watch	NOR	08/12/08	1	-
Moen Lake	1573800	Oneida	McLaughlin/Pallardy	NOR	06/19/08	3	-,-,-
Moen Lake	1573800	Oneida	McLaughlin/Pallardy	NOR	07/24/08	3	-,-,-
Moen Lake	1573800	Oneida	McLaughlin/Pallardy	NOR	08/15/08	3	-,-,-
Pelican Lake	1579900	Oneida	Watch / Wickman	NOR	08/11/08	1	-
Sand Lake	1597000	Oneida	McLaughlin/Pallardy	NOR	07/28/08	1	-
Two Sisters Lake	1588200	Oneida	McLaughlin/Pallardy	NOR	07/28/08	1	-
Black Otter Lake	315600	Outagamie	Coady	NER	07/03/08	3	-,-,-
Big Butternut Lake	2641000	Polk	Larson	NOR	07/09/08	3	-,-,-
Big Butternut Lake	2641000	Polk	Larsen	NOR	08/14/08	3	-,-,-
Clam Falls Flowage	2666400	Polk	Larson	NOR	07/11/08	3	-,-,-
Clam Falls Flowage	2666400	Polk	Larson	NOR	08/02/08	3	-,-,-
Adams Lake	267800	Portage	Kitter	WCR	07/31/08	1	-
Biron Flowage	1396900	Portage / Wood	Kitter	WCR	07/21/08	3	-,-,-
Biron Flowage	1396900	Portage / Wood	Kitter	WCR	09/06/08	3	-,-,-
Collins Lake	270200	Portage	Kitter	WCR	08/21/08	2	-,-
Lake Du Bay	1412200	Portage/ Marathon	Kitter	WCR	06/25/08	3	-,-,-
Lake Du Bay	1412200	Portage/ Marathon	Kitter	WCR	09/06/08	3	-,-,-
Lake Emily	189800	Portage	Kitter	WCR	06/24/08	3	-,-,-
Lake Emily	189800	Portage	Kitter	WCR	08/21/08	3	-,-,-
Lake Helen	287200	Portage	Kitter	WCR	06/24/08	1	-
Lime Lake	190100	Portage	Kitter	WCR	07/31/08	1	-
McDill Pond	1403200	Portage	Kitter	WCR	07/21/08	1	-
Stevens Point Flowage	1409400	Portage	Kitter	WCR	06/25/08	2	-,-

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Cranberry Lake	2217000	Price	Wallace	NOR	06/25/08	2	-,-
Lac Sault Dore*	2236800	Price	Olson / Quagon	NOR	06/25/08	3	-,-,-
Lac Sault Dore*	2236800	Price	Olson / Quagon	NOR	08/14/08	3	-,-,-
Musser Flowage*	2245100	Price	Olson / Quagon	NOR	06/25/08	3	-,-,-
Musser Flowage*	2245100	Price	Olson / Quagon	NOR	08/12/08	3	-,-,-
Solberg Lake*	2242500	Price	Olson / Quagon	NOR	06/26/08	3	-,-,-
Solberg Lake*	2242500	Price	Olson / Quagon	NOR	08/12/08	3	-,-,-
Bohners Lake	750800	Racine	Berg / Kopenstein	SER	06/13/08	3	-,-,-
Bohners Lake	750800	Racine	Nadolny	SER	07/24/08	3	-,-,-
Bohners Lake	750800	Racine	Berg / Kopenstein	SER	08/15/08	3	-,-,-
Browns Lake	750300	Racine	Nadolny / Berg	SER	06/21/08	3	-,-,-
Browns Lake	750300	Racine	Berg / Nadolny	SER	07/31/08	3	-,-,-
Browns Lake	750300	Racine	Berg / Patel	SER	08/23/08	3	-,-,-
Lake Keesus	852400	Racine	Nadonly / Berg	SER	06/28/08	3	-,-,-
Lake Keesus	852400	Racine	Berg / Nadolny	SER	08/02/08	3	-,-,-
Long Lake	520010	Racine	Berg / Chase	SER	08/24/08	3	-,-,-
Paddock Lake	737900	Racine	Berg /Crinch / Harris	SER	06/22/08	3	-,-,-
Tichigan Lake	763600	Racine	Berg / DeMent	SER	06/27/08	3	+,+,+
Tichigan Lake	763600	Racine	Berg / DeMent	SER	07/26/08	3	+,+,+
Audie Lake	2368700	Rusk	Heuschele / Brady	BCR	06/26/08	3	-,-,-
Audie Lake	2368700	Rusk	Heuschele / Brady	BCR	08/14/08	3	-,-,-
Boot Lake	1836700	Rusk	Heuschele / Brady	BCR	06/17/08	2	-,-
Boot Lake	1836700	Rusk	Heuschele / Brady	BCR	07/14/08	2	-,-
Boot Lake	1836700	Rusk	Heuschele / Brady	BCR	08/05/08	2	-,-
Bucks Lake	2111700	Rusk	Heuschele / Brady	BCR	06/26/08	1	-
Bucks Lake	2111700	Rusk	Heuschele / Brady	BCR	07/23/08	1	-
Bucks Lake	2111700	Rusk	Heuschele / Brady	BCR	08/14/08	1	-
Island Lake	2350200	Rusk	Wallace	NOR	07/10/08	3	-,-,-
Perch Lake (Bass)	2368500	Rusk	Heuschele / Brady	BCR	06/24/08	2	-,-
Perch Lake (Bass)	2368500	Rusk	Heuschele / Brady	BCR	07/23/08	2	-,-
Perch Lake (Bass)	2368500	Rusk	Heuschele / Brady	BCR	08/14/08	2	-,-
Potato	2355300	Rusk	Wallace	NOR	07/10/08	3	-,-,-
Pulaski Lake	1785900	Rusk	Heuschele / Brady	BCR	06/18/08	2	-,-
Pulaski Lake	1785900	Rusk	Heuschele / Brady	BCR	07/14/08	2	-,-
Pulaski Lake	1785900	Rusk	Heuschele / Brady	BCR	08/06/08	2	-,-
Round Lake	1788200	Rusk	Heuschele / Brady	BCR	06/18/08	1	-
Round Lake	1788200	Rusk	Heuschele / Brady	BCR	07/14/08	1	-
Round Lake	1788200	Rusk	Heuschele / Brady	BCR	08/06/08	1	-

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Sand Lake	2353600	Rusk / Chippewa	Wallace	NOR	08/08/08	3	-,-,-
Mirror Lake	1296000	Sauk	Henneman / Dowd	SCR	07/02/08	3	-,-,-
Mirror Lake	1296000	Sauk	Henneman / Dowd	SCR	07/29/08	3	-,-,-
Mirror Lake	1296000	Sauk	Henneman / Dowd	SCR	08/18/08	3	-,-,-
Lake Redstone	1280400	Sauk	Henneman / Dowd	SCR	07/02/08	3	-,-,-
Lake Redstone	1280400	Sauk	Henneman / Dowd	SCR	07/28/08	3	-,-,-
Redstone	1280400	Sauk	Henneman / Dowd	SCR	08/18/08	3	-,-,-
Barber Lake	2382300	Sawyer	Wallace	NOR	06/25/08	2	-,-
Birch Lake *	2113000	Sawyer/ Washburn	Olson / Quagon	NOR	06/16/08	3	-,-,-
Birch Lake *	2113000	Sawyer/ Washburn	Olson / Quagon	NOR	07/28/08	3	-,-,-
Chetac Lake	2113300	Sawyer	Wallace	NOR	07/22/08	3	-,-,-
Lower Clam Lake*	2429300	Sawyer	Olson / Quagon	NOR	08/05/08	2	-,-
Lower Clam Lake*	2429300	Sawyer	Olson / Quagon	NOR	07/02/08	2	-,-
Durphee Lake *	2396800	Sawyer	Olson / Quagon	NOR	06/18/08	1	-
Durphee Lake *	2396800	Sawyer	Olson / Quagon	NOR	07/29/08	1	-
Grindstone	2391200	Sawyer	Wallace	NOR	07/22/08	3	-,-,-
Lake of the Pines*	2275300	Sawyer	Olson / Quagon	NOR	06/23/08	3	-,-,-
Lake of the Pines*	2275300	Sawyer	Olson / Quagon	NOR	08/13/08	3	-,-,-
Nelson Lake*	2704200	Sawyer	Olson / Quagon	NOR	06/17/08	3	-,-,-
Nelson Lake*	2704200	Sawyer	Olson / Quagon	NOR	07/31/08	3	-,-,-
Sissabagama Lake *	2393500	Sawyer	Olson / Quagon	NOR	06/18/08	3	-,-,-
Sissabagama Lake *	2393500	Sawyer	Olson / Quagon	NOR	07/29/08	3	-,-,-
Whitefish Lake*	2392000	Sawyer	Olson / Quagon	NOR	06/19/08	3	-,-,-
Whitefish Lake*	2392000	Sawyer	Olson / Quagon	NOR	07/30/08	3	-,-,-
Cloverleaf Lake–Pine	299100	Shawano	Nordin	NER	09/24/08	3	-,-,-
Cloverleaf Lake–Pine	299100	Shawano	Nordin	NER	09/24/08	3	-,-,-
Loon Lake	323800	Shawano	Coady	NER	07/24/08	3	-,-,-
White Clay Lake	326400	Shawano	Reyburn	NER	07/08/08	2	-,-
Wolf River	241300	Shawano	Nordin	NER	08/20/08	3	-,-,-
Chequamegon Waters	2160700	Taylor	Wallace	NOR	08/08/08	2	-,-

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Ballard Lake*	2340700	Vilas	Olson / Quagon	NOR	07/09/08	3	-,-,-
Ballard Lake*	2340700	Vilas	Olson / Quagon	NOR	08/19/08	3	-,-,-
Big Arbor Vitae Lake*	1545600	Vilas	Olson / Quagon	NOR	08/20/08	3	-,-,-
Big Arbor Vitae Lake*	1545600	Vilas	Olson / Quagon	NOR	07/08/08	3	-,-,-
Big Lake	2334700	Vilas	McLaughlin/Pallardy	NOR	08/07/08	1	-
Big Saint Germain Lake	1591100	Vilas	McLaughlin/Pallardy	NOR	06/16/08	3	-,-,-
Big Saint Germain Lake	1591100	Vilas	McLaughlin/Pallardy	NOR	07/21/08	3	-,-,-
Big Saint Germain Lake	1591100	Vilas	McLaughlin/Pallardy	NOR	08/18/08	3	-,-,-
Catfish Lake	1603700	Vilas	McLaughlin/Pallardy	NOR	08/14/08	3	-,-,-
Clear Lake *	2329000	Vilas	Olson / Quagon	NOR	07/10/08	3	-,-,-
Clear Lake *	2329000	Vilas	Olson / Quagon	NOR	08/21/08	3	-,-,-
Eagle Lake	1600200	Vilas	McLaughlin/Pallardy	NOR	08/14/08	3	-,-,-
High Lake*	2344000	Vilas	Olson / Quagon	NOR	07/07/08	3	-,-,-
High Lake*	2344000	Vilas	Olson / Quagon	NOR	08/18/08	3	-,-,-
Kentuck Lake	716800	Vilas / Forest	McLaughlin / Watch	NOR	08/12/08	1	-
Lac Du Lune	2766200	Vilas	McLaughlin/Pallardy	NOR	08/07/08	1	-
Little Arbor Vitae Lake *	1545300	Vilas	Olson / Quagon	NOR	07/09/08	3	-,-,-
Little Arbor Vitae Lake *	1545300	Vilas	Olson / Quagon	NOR	08/20/08	3	-,-,-
Upper Buckatabon Lake	1621800	Vilas	McLaughlin/Pallardy	NOR	08/07/08	1	-
Rest Lake	1013800	Vilas	McLaughlin/Pallardy	NOR	06/16/08	3	-,-,-
Rest Lake	2327500	Vilas	McLaughlin/Pallardy	NOR	07/21/08	3	-,-,-
Rest Lake	2327500	Vilas	McLaughlin/Pallardy	NOR	08/18/08	3	-,-,-
Lake Como	757900	Walworth	Nadolny	SER	07/23/08	4	-,-,-,-
Lake Como	757900	Walworth	Nadolny	SER	08/30/08	3	-,-,-
Green Lake	755800	Walworth	Berg / Rodenkirch	SER	06/13/08	3	-,-,-
Potters Lake	753800	Walworth	Nadolny / Berg	SER	06/21/08	3	-,-,-
Potters Lake	753800	Walworth	Nadolny / Patel	SER	07/19/08	3	+,+,+
Potters Lake	753800	Walworth	Berg / Nadolny	SER	07/31/08	3	+,+,+
Potters Lake	753800	Walworth	Berg / Patel	SER	08/23/08	3	+,+,+
Turtle Lake	795100	Walworth	Nadolny / Groner	SER	06/18/08	3	-,-,-
Turtle Lake	795100	Walworth	Nadolny / Groner	SER	07/18/08	3	-,-,-
Turtle Lake	795100	Walworth	Nadolny / Groner	SER	09/10/08	3	-,-,-
Whitewater Lake	816800	Walworth	Chase / Ganfield	SER	06/27/08	3	-,-,-
Whitewater Lake	816800	Walworth	Chase / Ganfield	SER	07/18/08	3	-,-,-
Whitewater Lake	816800	Walworth	Chase / Ganfield	SER	08/22/08	3	-,-,-

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Cable Lake	2456100	Washburn	Larson	NOR	07/28/08	3	-,-,-
Pokegoma Lake	2696300	Washburn	Larson	NOR	07/23/08	3	-,-,-
Shell Lake	2496300	Washburn	Vold	NOR	06/23/08	2	-,-
Shell Lake	2496300	Washburn	Vold	NOR	06/23/08	3	-,-,-
Shell Lake	2496300	Washburn	Vold	NOR	07/14/08	2	-,-
Shell Lake	2496300	Washburn	Vold	NOR	07/14/08	3	-,-,-
Shell Lake	2496300	Washburn	Vold	NOR	09/15/08	5	-,-,-,-,-
Stone Lake*	1884100	Washburn	Olson / Quagon	NOR	07/24/08	3	-,-,-
Ashippun Lake	854300	Waukesha	Nadolny / Berg	SER	06/28/08	3	+,+,+
Ashippun Lake	854300	Waukesha	Nadolny / Berg	SER	07/13/08	3	+,+,+
Denoon Lake	761300	Waukesha	Chase / Bunk	SER	09/22/08	3	+,+,+
Denoon Lake	761300	Waukesha	Chase / Bunk	SER	09/22/08	1	+
Pretty Lake	779300	Waukesha	Chase / Bjodstrup	SER	06/20/08	3	-,-,-
Pretty Lake	779300	Waukesha	Chase / Bjodstrup	SER	07/22/08	3	-,-,-
Pretty Lake	779300	Waukesha	Chase / Bjodstrup	SER	08/22/08	1	-
Pretty Lake	779300	Waukesha	Chase / Bjodstrup	SER	08/22/08	2	-,-
Friess Lake	853200	Washington	Nadolny / Glunz	SER	06/18/08	3	-,-,-
Friess Lake	853200	Washington	Nadolny / Glunz	SER	07/16/08	3	-,-,-
Friess Lake	853200	Washington	Nadolny / Glunz	SER	08/13/08	3	-,-,-
Little Friess Lake	853100	Washington	Nadonly / Patel	SER	07/16/08	3	-,-,-
Little Friess Lake	853100	Washington	Berg / Chase	SER	07/20/08	3	-,-,-
Little Friess Lake	853100	Washington	Nadolny / Berg	SER	08/09/08	3	-,-,-
Bass Lake (chain)	264200	Waupaca	Coady	NER	08/11/08	2	-,-
Columbia Lake (chain)	262400	Waupaca	Coady	NER	08/11/08	2	-,-
Long Lake (chain)	261200	Waupaca	Coady	NER	08/11/08	2	-,-
Round Lake (chain)	265000	Waupaca	Coady	NER	08/11/08	2	-,-
Black River	Hwy 35		Fischer / Giblin		09/10/08	1	-
Chippewa River	Hwy 35		Fischer / Giblin		09/10/08	1	-
Miss. River LD 2	Tailwater		Fischer / Giblin		09/10/08	1	+
Miss. River LD 3	Tailwater		Fischer / Giblin		09/10/08	1	+
Miss. River LD 4	Tailwater		Brecka / Marron		09/10/08	1	+
Miss. River LD 4 REP	Tailwater		Brecka / Marron		09/10/08	1	+
Miss. River LD 5	Tailwater		Brecka / Marron		09/10/08	1	+
Miss. River LD 5a	Tailwater		Brecka / Marron		09/10/08	1	+
Miss. River LD 6	Tailwater		Benjamain/ Schwitzer		09/10/08	1	+

Lake	WBIC	County	Collector(s)	Region	Date Sample was taken	Number of Samples	+/-
Miss. River LD 7	Tailwater		Benjamain/ Schwitzer		09/10/08	1	+
Miss. River LD 8	Tailwater		Short / Roensch		09/10/08	1	+
Miss. River LD 9	Tailwater		Short / Roensch		09/10/08	1	+
St. Croix River	Prescott		Fischer / Giblin		09/10/08	1	-
Wisconsin River	Mouth		Short / Roensch		09/10/08	1	-

*Denotes GLIFWC Sample

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APPENDIX 1

Organisms that have life-stages that can be easily confused with zebra mussel veligers

Some of the micro-crustaceans have life-stages with similar sizes and shapes as the zebra mussel veliger. The biologists doing the microscope needs to be aware of these and persistent in probing the potential veliger into a position where the organisms can be positively identified. Two small crustaceans in particular that can pose a challenge in preserved samples are ostracods and cladacerans. This is rarely a problem with live samples.

Ostracoda

Commonly known as seed shrimps, some ostracods have life-stages tat resemble the shape and size of a zebra mussel veliger. Furthermore, the ostracod carapace is similar to those of the bivalves and is impregnated with calcium carbonate that causes the ostracod to show up with a "cross" or "X" on it under the microscope similar to zebra mussel veliger when viewed under cross-polarized light. The ostracods most similar to zebra mussel veligers are in the range of 200-300μm. In comparison the zebra mussel veliger typically ranges from 60-300μm. Antennae, eye, caudal furca, or the thoracic leg were features commonly used to distinguish the ostracods from the veliger

Cladocera

Known commonly as water fleas, cladocerans can also at times be mistaken for veligers. The cladocerans ranges from around 200μm, which is in the size range of veligers. The eye structures, as well as the head, which is shaped like a "hood", are present in the cladocera but not in zebra mussel veliger. These structures may be difficult to spot on the early life-stages of some cladocerans

By: Amy Bellows

APPENDIX 2

Zebra Mussel Presence in Wisconsin Waters

(veligers and adults) January 2008

Interstate Waters

Lake Michigan shoreline (1991) including Green Bay, Sturgeon Bay, Sturgeon Bay Canal (1993), Sheboygan River Estuary, Port Washington Harbor, Milwaukee River Estuary, South Milwaukee Harbor, Racine Harbor, and Kenosha Harbor
Lake Superior shore at Duluth-Superior Harbor (1989)
St. Louis River from the Wisconsin-Minnesota border to the Duluth-Superior Harbor (1989)
Mississippi River along the Wisconsin border (1991)
Lower St. Croix from Houlton south to the Mississippi River (2000)

Inland Lakes and Streams with established zebra mussel communities (veligers and adults)

County	Waterbody Name	Year Infested	WBIC
Adams	Arrowhead Lake	2004	1377700
	Castle Rock Lake	2004	1345700
	Petenwell Lake	2004	1377100
	Wisconsin River (From Nepco Lake to Petenwell Lake)*	2004	1179900
	Wisconsin River (From Petenwell Lake to Castle Rock Lake)*	2004	1179900
Brown	Fox River (From Lake Winnebago to Green Bay)	1999	117900
Buffalo	Lake Pepin	1991	731800
Calumet	Lake Winnebego	1999	131100
Crawford	East Channel	1991	723400
Dane	Lake Monona	2002	804600
Door	Clark Lake	2005	97700
	Little Sturgeon Bay	1993	92
Douglas	Mud Lake	1989	3000116
Fond Du Lac	Auburn Lake	2006	42400
	Lake Winnebago	1999	131100
	Long Lake	2001	38700
	Mauthe Lake	2006	38200
Forest	Lake Metonga	2001	394400
Grant	Coalpit Slough	1991	721700
	Oleary Lake	1991	721200
Green Lake	Green Lake	2001	146100
Jefferson	Golden Lake	2003	775900
	Ripley Lake	2007	809600
	Rock Lake	2005	830700
Juneau	Castle Rock Lake	2004	1345700
	Petenwell Lake	2004	1377100
	Wisconsin River (From Nepco Lake to Petenwell Lake)	2004	1179900
	Wisconsin River (From Petenwell Lake to Castle Rock Lake)	2004	1179900
Kenosha	Benedict Lake	2004	743900
	Elizabeth Lake	2001	742800
	Lake Andrea	2000	733850
	Lake Mary	2002	743000
	Lake Tombeau	2005	743800
	Powers Lake	2003	744200
	Silver Lake	1994	747900

County	Waterbody Name	Year Infested	WBIC
Manitowoc	Cedar Lake	2001	45100
	Pigeon Lake	2007	64000
Marinette	Chalk Hill Flowage	2006	634500
	Lake Noquebay	2006	525900
	White Rapids Flowage	2006	634300
Oconto	Machickanee Flowage	2002	448200
	Oconto River (From Machickanee Flowage to Green Bay)	1999	440200
	Oconto River (From Oconto Falls Pond to Machickanee Flowage)	2005	440200
Outagamie	Fox River (From Lake Winnebago to Green Bay)*	1999	117900
Pepin	Lake Pepin	1991	731800
Pierce	Lake Pepin	1991	731800
	Lake St. Croix	2000	2601500
Portage	Wazeecha Lake	2006	1391200
Racine	Racine Quarry	1994	400
	Unnamed Ditch (From Waubeesee Lake to Wind Lake Canal)	2002	760700
	Tichigan Lake	2007	763600
	Waubeesee Lake	1999	760900
	Wind Lake	2002	761700
St. Croix	Lake St Croix	2000	2601500
Shawano	Shawano Lake	2005	322800
	Shawano Lake – Unnamed Spring	2005	323100
Sheboygan	Crystal Lake	2001	45200
	Elkhart Lake	1994	59300
	Lake Ellen	2001	32500
	Long Lake	2001	38700
	Sheboygan Lake (From ditch to Sheboygan River)	1995	58900
	Sheboygan River (From Sheboygan Lake to Highway P)	2002	50700
	Unnamed Creek (From Elkhart Lake to Sheboygan Marsh ditches)	1995	59100
	Unnamed Ditch -Sheboygan Marsh (From unnamed tributary to Sheboygan Lake)	1995	59000
Vernon	Battle Slough	1991	725700
Walworth	Benedict Lake	2004	743900
	Delavan Lake	1999	793600
	Eagle Spring Lake	2005	768600
	Green Lake	1998	755800
	Honey Creek (From Mill Lake to pond near Pleasant Lake Road)	2002	751500
	Lake Beulah	1999	766600
	Lake Beulah Outlet (From Lake Beulah to Mukwonago River)*	1999	766300
	Lake Geneva	1995	758300
	Middle Lake	1998	755700
	Mill Lake	1998	755600
	Pleasant Lake	2005	741500
	Potters Lake	2008	753800
	Powers Lake	2003	744200
	Lake Tombeau	2005	743800
	White River (From Lake Geneva to Hillmoor Country Club)	2002	751200
Washington	Big Cedar Lake	2000	25300
	Cedar Creek (From Big Cedar Lake to Little Cedar Lake)	2002	21300

County	Waterbody Name	Year Infested	WBIC
Washington Continued	Cedar Creek (From Little Cedar Lake to 1/4 mi S of Pleasant Valley Road)	2002	21300
	Little Cedar Lake	2001	25100
	Pike Lake	2003	858300
Waukesha	Applebecker Millpond	1999	827700
	Ashippun Lake	2007	854300
	Bark River (From Applebecker Millpond to Upper Nemahbin Lake)	1999	813500
	Bark River (From Crooked Lake to State Highway 67)	1999	813500
	Bark River (From Lower Nemahbin Lake to Crooked Lake)	1999	813500
	Bark River (From Nagawicka Lake to Applebecker Millpond)	1999	813500
	Bark River (From Upper Nemahbin Lake to Lower Nemahbin Lake)	1999	813500
	Beaver Lake	2005	774400
	Crooked Lake	2001	826800
	Denoon Lake	2008	761300
	Eagle Spring Lake	2005	768600
	Fowler Lake	2002	849400
	Golden Lake	2003	775900
	Hunters Lake	2002	826300
	Lac La Belle	1999	848800
	Lake Beulah Outlet (From Lake Beulah to Mukwonago River)	1999	766300
	Lake Keesus	2005	852400
	Little Muskego Lake	1999	762700
	Lower Nashotah Lake	1999	827300
	Lower Nemahbin Lake	1999	827000
	Lower Phantom Lake	2002	765800
	Middle Genesee Lake	2004	778300
	Mukwonago River (From Lake Beulah Outlet to Lower Phantom Lake)	2002	765500
	Muskego Creek (From Little Muskego Lake to Big Muskego Lake)	2002	762500
	Nagawicka Lake	1998	828000
	North Lake	2002	850800
	Oconomowoc Lake	1999	849600
	Oconomowoc River (From Lac La Belle to Highway 16)	1999	848200
	Oconomowoc River (From Upper Oconomowoc Lake to Oconomowoc Lake)	1999	848200
	Okauchee Lake	2004	850300
	Pewaukee Lake	2004	772000
	Pewaukee River (From Pewaukee Lake to Highway 16)	2004	771700
	Pine Lake	2005	779200
	Silver Lake	2004	779800
	Spring Lake	2004	770600
	Upper Nemahbin Lake	1998	827100
	Upper Oconomowoc Lake	1999	850100
	Upper Phantom Lake	2002	766000
Waupaca	Partridge Lake	2005	253800
	Wolf River (From Partridge Lake to Lake Poygan)*	2005	241300
Waushara	Lake Poygan	2000	242800
	Big Silver Lake	2006	107900
Winnebago	Fox River (From Lake Butte Des Morts to Lake Winnebago)	1999	117900
	Fox River (From Lake Winnebago to Green Bay)*	1999	117900
	Fox River (From Yost Road boat launch to Lake Butte Des Morts)	1999	117900

County	Waterbody Name	Year Infested	WBIC
Winnebago Continued	Fox River Lock Channel - Menasha	1999	117900
	Lake Butte Des Morts	1999	139900
	Lake Poygan	2000	242800
	Lake Winnebago	1999	131100
	Lake Winneconne	1999	241600
	Little Lake Butte Des Morts	1999	129800
	Neenah Channel	1999	130600
	Wolf River (From Partridge Lake to Lake Poygan)	2005	241300
	Wolf River (From Lake Winneconne to Lake Butte Des Morts)	1999	241300
Wood	Nepco Lake	2002	1389800
	Petenwell Lake	2004	1377100
	Wazeecha Lake	2006	1391200
	Wisconsin River (From Nepco Lake to Petenwell Lake)*	2004	1179900

APPENDIX 3

Zebra Mussel Watch List of Wisconsin Waters

(veligers or adults), current as of January, 2008

County	Waterbody Name	Year Added	WBIC
Dane	Wingra Lake	2003	805000
Door	Kangaroo Lake	2005	98600
Florence	Brule River Flowage	2005	704400
Forest	Outlet Creek	2006	394200
Oconto	Oconto Falls Pond	2007	440200
Shawano	Wolf River Pond	2007	322500
Sawyer	Round Lake	2001	2395600
Washburn	Gilmore Lake	2005	2695800
Waupaca	Columbia Lake	2001	262400
	Long Lake	2001	296100
	Round Lake	2001	265000
	Partridge Crop	2001	272000
Waushara	Long Lake	2002	1000800
Vilas	Big Lake	2003	2334700

APPENDIX 4 – Upper Mississippi River Monitoring

Wisconsin DNR samples the Mississippi River for zebra mussel larvae at nine sites extending from Hastings, MN (Lock and Dam 2) to Lynxville, WI (Lock and Dam 9) as part of a multi-agency effort to evaluate the distribution and abundance of zebra mussels in the Upper Mississippi River system. This is completed to evaluate general temporal trends and changes in the longitudinal distribution of zebra mussels in the Upper Mississippi River. Tributary sampling is done at major tributaries to assess expansion of zebra mussels to new areas. Sampling is done at fixed sites with the emphasis of collecting water samples that are representative of the river's cross-section. In Wisconsin, additional information is collected on water quality variables (DO, temp, pH, conductance, transparency, turbidity, chlorophyll a) to help with general longitudinal water quality assessments and provide additional information for evaluating potential zebra mussel-induced impacts on water quality.

John Sullivan - Wisconsin Department of Natural Resources (WCR)