Response Activities Following the First Verified Discovery of Hydrilla (*Hydrilla verticillata*) in Wisconsin

In summer 2005, a suspicious aquatic plant was found growing in a 1.5 acre (0.6 ha) excavated private pond located in Marinette County in northeastern Wisconsin (Figure 1; approx. lat/long coordinates: 45.41438, -88.06003). The landowner originally believed the plant was common waterweed (*Elodea canadensis*), but because the pond was stocked with plants purchased outside of Wisconsin and the plant looked "different", the landowner sought an exact identification. In July 2007, several taxonomic experts, including Dr. Mike Netherland of the U.S. Army Corps of Engineers (USACE) determined that the suspicious plant was monoecious hydrilla (*Hydrilla verticillata*). Managers hypothesize that this hydrilla 'hitchhiked' along with other aquatic plants purchased from the out of state vendor, as the landowner indicated that they did not intentionally purchase or plant it.

Figure 1: Approximate location of hydrilla (*Hydrilla verticillata*) found in a small private pond in northeastern Wisconsin (Marinette Co.).

After verification of the plant identification, the Marinette County Land and Water Division (LWCD) worked with the Wisconsin Department of Natural Resources (WDNR) to apply for an Aquatic Invasive Species Early Detection and Response grant to help fund eradication and monitoring of the hydrilla. The Department of Agriculture, Trade and Consumer Protection (DATCP) took the lead in coordinating the response activities following the discovery since the pond was licensed as a fish-rearing facility by that agency. A team composed of staff from DATCP, WDNR, USACE and LWCD was assembled to outline a response plan. The landowner also played a cooperative and active role in plan implementation.

Initial reconnaissance monitoring was conducted, and hydrilla was observed to be well-established throughout the shallow half of the pond, as well as present in scattered shallow areas around the perimeter of the deep half of the pond (Figure 2). The landowner indicated that this current distribution was much wider spread than the initial sighting two years prior. Hydrilla in these areas was observed to be growing just below and up to the surface of the pond. A boat with an underwater camera was utilized to search for hydrilla in the deep half of the pond (max depth = 12 ft), but no hydrilla or other vegetation was observed growing in these deeper areas. The entire pond was outfitted with a plastic liner bottom, but no sediment was placed over the liner bottom in the deeper half of the pond, except around the outer perimeter. In addition, a blue dye was present throughout the pond, which may have limited light penetration to the deeper areas.

Figure 2: Dense population of hydrilla (*Hydrilla verticillata*) growing in a small private pond in northeastern Wisconsin (Marinette Co.).

On August 29, 2007 a certified pesticide applicator chemically treated the pond with liquid endothall (Aquathol® K) at 3.0 ppm following the treatment plan developed by the response team. Several members of the response team were present to observe the treatment. The treatment completely killed the vegetative portion of the hydrilla, reducing the possibility of it being carried to another waterbody before, during or after subsequent control activities.

Following the herbicide application, the response team recommended that the pond be completely dewatered in order to freeze hydrilla tubers and propagules to render them incapable of germinating in spring 2008. On October 19, 2007 a well drilling company began draining the pond. A centrifugal pump with a pumping rate of 60,000 gallons/hour was utilized, and dewatering took three days to complete (Figures 3 & 4). Additional smaller pumps were also needed to pump out water within the small depressions in the shallow area of the pond (Figure 5). Water was pumped onto an upland area owned by the landowner and was observed to quickly soak into the sandy soils. The well drilling company staff were informed about the importance of thoroughly flushing and cleaning all equipment after the pumping was completed to avoid accidental transport of hydrilla propagules. Following this main dewatering event, the landowners continued pumping of the small depressions of the pond as water drained into them in order to facilitate sediment drainage and drying as much as possible prior to freezing.

Figure 3: Shallow half of the private pond following dewatering in fall 2007.

Figure 4: Deep half of the private pond following dewatering in fall 2007.

Figure 5: Small depressions still holding some water in the shallow half of the private pond following dewatering in fall 2007.

On November 2, 2007 the pond's sandy loam bottom sediment had drained and dried, and several members of the response team were able to walk over it and excavate the sediment for tubers. No vegetative hydrilla biomass was detected and very little root structure was encountered in the soil. Sediment samples were excavated from two distinct areas of the pond which previously had dense hydrilla growth. The sample locations were 1.7 and 2.2 square feet in area and excavated to approximately 7 inches deep. The sediment was screened using a small mesh sifting device, and 12 hydrilla tubers were collected from one of the two locations. Tubers were then planted in two separate quart milk containers with soil collected from the pond, and one container was left in the heated wet lab while the other was placed in a freezer. Hydrilla tubers germinated in the container left in the warm lab after 3 to 4 weeks. After a month had passed, the frozen container was taken out, filled with water, and left in the warm wet lab. The tubers which were frozen did not germinate under warm lab conditions, which indicated that freezing would impact the tubers capability to germinate.

During winter 2007-2008 the landowners kept a record of frost depth with an officially installed frost-measuring probe on their property. Frost was found to have penetrated at least 11 inches into the soil prior to snow cover. When the snow melted 6 square feet of pond sediment was excavated and screened using a mesh sifting device. Eleven tubers were found which exhibited variable color (black to white) and most were mushy except one, which was firmer to touch. The tubers were taken to the wet lab and planted within

an aquarium that contained soil from the pond. None of the 11 tubers germinated in the aquarium.

On May 29, 2008 members of the response team visited the pond to locate any germinating hydrilla. An underwater camera was used to view the partially filled pond and visual observations were also done around the perimeter. No hydrilla was seen growing during the visit.

On June 17, 2008 a certified pesticide applicator treated the refilled pond with pelletized fluridone (Sonar® Q) at a rate of 30 ppb to prevent the growth of any still viable hydrilla propagules, which followed the treatment plan developed by the response team. The response team recommended maintaining a fluridone concentration of 5-10 ppb in the pond throughout the growing season to kill any potential new hydrilla growth. A day after the treatment the pellets were observed to be slowly dissolving on the bottom of the pond. The landowner was instructed to take a grab sample of pond water every 30 days during the summer and send these samples overnight for analysis of the fluridone concentration over time. On July 25, 2008 the landowner collected a grab sample and the concentration of fluridone was determined to be 16.7 ppb. On August 24, 2008 the landowner collected another pond water sample, and the fluridone concentration was determined to be 9.8 ppb.

Members of the response team visited the pond a few times during the 2008 growing season and noted an absence of hydrilla when walking around the pond. The landowner also monitored the pond and did not see any hydrilla growth. On July 8, 2009 members of the response team visited the pond and did a thorough reconnaissance. The entire perimeter of the pond was monitored from shore using polarized sunglasses to help cut water surface glare. A boat with an underwater viewing scope and underwater camera was utilized to search for hydrilla in the deeper areas of the pond, with none detected. Based on no observations of hydrilla following the management activities which were implemented, the decision was made to close the early detection and response grant in August 2009.

Staff from the WDNR conducted a follow up inspection of the pond on August 30, 2011. A boat with an underwater viewing scope and underwater camera was utilized to search for hydrilla in the deeper areas of the pond, and visual observations were also conducted around the entire perimeter. No visible signs of hydrilla growth were observed. The landowner also stated that they had not seen any sign of hydrilla since management was completed in 2008. Since 2011, staff from the LWCD have been back to the pond at least 10 times and have not seen any evidence of hydrilla. It is believed that the dewatering and freezing of drained sediment in the pond was key in eradicating the hydrilla, as any tubers were frozen and left unviable to generate new growth in the spring.