2010 Mississippi Survey for Hydrilla and Giant Salvinia

Giant salvinia in Wedgeworth Creek, Forrest County, MS

A Report to the Mississippi Bureau of Plant Industry

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Introduction

Aquatic plants are a vital component in our water bodies and aquatic ecosystems. By maintaining an appropriate equilibrium within these systems, we can greatly benefit from the use of water and its recreational opportunities. Invasive aquatic plants pose a threat to these systems and present obstacles in these water bodies when introduced. Interruption of natural and vital ecological interactions by these species can change the properties of ecosystems, decrease water quality and property value, and limit recreational use in and around these areas (Madsen 2004).

Water bodies in Mississippi provide recreational opportunities, transportation, municipal and drinking supply, and wildlife habitat. The introduction of invasive plant species may dramatically harm these water bodies and their functions. Hydrilla [*Hydrilla verticillata* (L.f.) Royle] and giant salvinia (*Salvinia molesta* D. S. Mitchell) are two aquatic plants that are non-native and present in Mississippi waterbodies. Hydrilla is a submersed aquatic plant native to warmer areas of Asia and has become a serious nuisance plant in the United States (Langeland 1996). The specialized growth habit, reproduction, and physiological properties of hydrilla make it superior to neighboring plant species in the gathering of light, nutrients, and oxygen. For this reason, hydrilla has the well-deserved nickname "the perfect aquatic weed". Although both dioecious and monoecious biotypes of hydrilla exist in the United States, only the dioecious biotype occurs in Mississippi. Hydrilla can reproduce by fragmentation and through the production of turions and tubers (subterranean turions). Giant salvinia is a free-floating aquatic fern native to southeastern Brazil. It primarily reproduces asexually (daughter plants arising from buds on stolons) and may double in leaf number in less than 8 days (McFarland et al. 2004). Its free-floating nature also enables giant salvinia to travel long distances over a short time during flood events or after being transported by boat or other equipment. The rapid growth rate and proficient reproduction methods of giant salvinia make it an extreme nuisance and competitor in aquatic environments.

Hydrilla and Giant salvinia are both listed on the state Noxious Weed List for Mississippi and the Federal Noxious Weed List. To detect and rapidly respond to infestations of these nuisance species, monitoring and management programs should be implemented. Mississippi State University and the Mississippi Bureau of Plant Industry have developed a Memorandum of Agreement to survey bodies of water in the state of Mississippi for aquatic plant species listed on the State Noxious Weed List. This agreement has been renewed over the last five years to serve as part of an invasive plant monitoring program for the state of Mississippi. An update to the current status of hydrilla and giant salvinia occurrence in the state of Mississippi is included in the following report.

Methodology

Surveys to detect the presence or absence of hydrilla and giant salvinia have been conducted across Mississippi since 2005. Numerous locations surveyed in 2010 had not been previously surveyed, while the Ross Barnett Reservoir, Wedgeworth Creek, and Fallen Oak Golf Course were revisited for an update on hydrilla or giant salvinia occurrence after they were detected in previous surveys. A Trimble Yuma® with Global Positioning System (GPS) capabilities was used to obtain geographic locations at approximately 3 m position accuracy. All data was collected and reported in latitude and longitude under datum WGS 84. Location maps with present points were produced using ArcGIS-ArcMap, version 9.2.

Hydrilla and Giant Salvinia Status

Locations at which hydrilla or giant salvinia were found in Mississippi in 2010 are indicated in Figure 1 with yellow or fuchsia stars, respectively; while all locations surveyed in 2010 and the past at which no noxious weeds were found are indicated with a black dot Figure 1.

Hydrilla Status

1- Bluff Lake

Hydrilla was found in Bluff Lake at the Noxubee National Wildlife Refuge in 2010 (Table 1). Numerous, topped-out mats were documented growing in the northern portion of the lake (Figure 2). Hand-pulling has previously been conducted, according to the United States Fish and Wildlife Service. This is not an effective method of control for hydrilla, due to its vigorous growth habit. A tuber bank is very likely to be present in the sediment of Bluff Lake, given its extensive history of hydrilla occurrence. Changes to the management of hydrilla in Bluff Lake should be considered in the future to prevent further spread throughout the lake. Bluff Lake was not surveyed in 2009; however, hydrilla was documented there in 2008 (Robles et al. 2009).

2- Loakafoma Lake

Two to three hydrilla plants were found in Loakafoma Lake at the Noxubee National Wildlife Refuge in 2010 (Table 1). These plants were observed growing just northwest of the boat launch along the edge of an extensive flat of American lotus (*Nelumbo lutea* Willd.) (Figure 3). Hydrilla was reported to be present in Loakafoma Lake in 2006 (Madsen et al. 2007). All observed hydrilla plants were removed after documentation, but rigorous monitoring and control should be conducted to prevent re-infestation from occurring.

3- Ross Barnett Reservoir

Hydrilla populations were observed only in the northern portion of the Reservoir in 2010. These specific locations are not new to hydrilla presence and have been receiving treatments over the last five years. Active management of hydrilla since 2005 has suppressed the populations (Wersal et al. 2009), as indicated by field observation. Most of the populations are small and somewhat scattered, with very few tubers being found in the sediment since 2005. This suggests that the chemical treatments have been successful and the scattered occurrence of hydrilla in the reservoir may be attributed to fragmentation by boat traffic and/or water movement. Management of hydrilla is currently being conducted on the reservoir by AquaServices, Inc., and distribution of the species is being monitored.

4- Fallen Oak Golf Course

In August of 2009, hydrilla was observed in the ponds adjacent to holes 1 and 18 on the course (Cox et al. 2010). However, hydrilla was not observed growing in any of the ponds on the golf course in 2010. It appears that the 2009 fall and 2010 spring fluridone treatments conducted by Aquaservices, Inc. were successful in eradicating hydrilla at this site. Monitoring for hydrilla in the ponds should continue in the future to prevent any reoccurrence and potential spread.

Giant salvinia Status

1- Wedgeworth Creek

The giant salvinia population in Wedgeworth Creek, Forrest County, MS (Table 2) has grown profusely throughout the creek since 2009. In September 2010, it was observed growing along the shoreline out to approximately 4 meters and forming dense mats (Figure 4). In addition to that, the portion of the creek just south of the bridge on Sims Road, as well as some of the area north of the bridge, was completely enclosed with giant salvinia (Figure 5). In 2007, the giant salvinia population completely enclosed Wedgeworth Creek (Robles et al. 2008) (Figure 6); however, an unknown agent appeared to have completely wiped out the population from 2007 to 2008 (Robles et al. 2009) (Figure 7). Evidence of regrowth in August 2009 (Figure 8) proved that the giant salvinia population was not previously eradicated but only suppressed.

It is evident that the introduction of the biological control agent, salvinia weevil (*Cyrtobagous salviniae*), to the area in 2006 (Robles et al. 2008) may have suppressed the growth giant salvinia to some extent at this site, but has not completely eradicated this plant (Figure 9). Chemical control efforts should be implemented to rid this site of giant salvinia, and monitoring should be continued to record its distribution into any neighboring water bodies.

Conclusions and Recommendations

Persisting hydrilla populations in the Ross Barnett Reservoir, Bluff Lake, and Loakafoma Lake suggest that control methods should be continued or initiated in these areas. Observed hydrilla populations at Fallen Oak and Wall Doxey Lake in 2009 should continue to be monitored after treatment to prevent reinfestation. Hydrilla treatment on Ross Barnett is presently active and being monitored for control efficacy. Persisting hydrilla populations in Bluff and Loakafoma Lakes suggest that control techniques may need to be modified. Aggressive control for hydrilla is imperative for all infested sites indicated to prevent future establishment and spread to neighboring locations.

The giant salvinia population in Wedgeworth Creek still persists and is expanding. The salvinia weevil has not been effective in eradicating giant salvinia from this location. Therefore, more aggressive control techniques should be used to completely remove surviving plants before future spread occurs.

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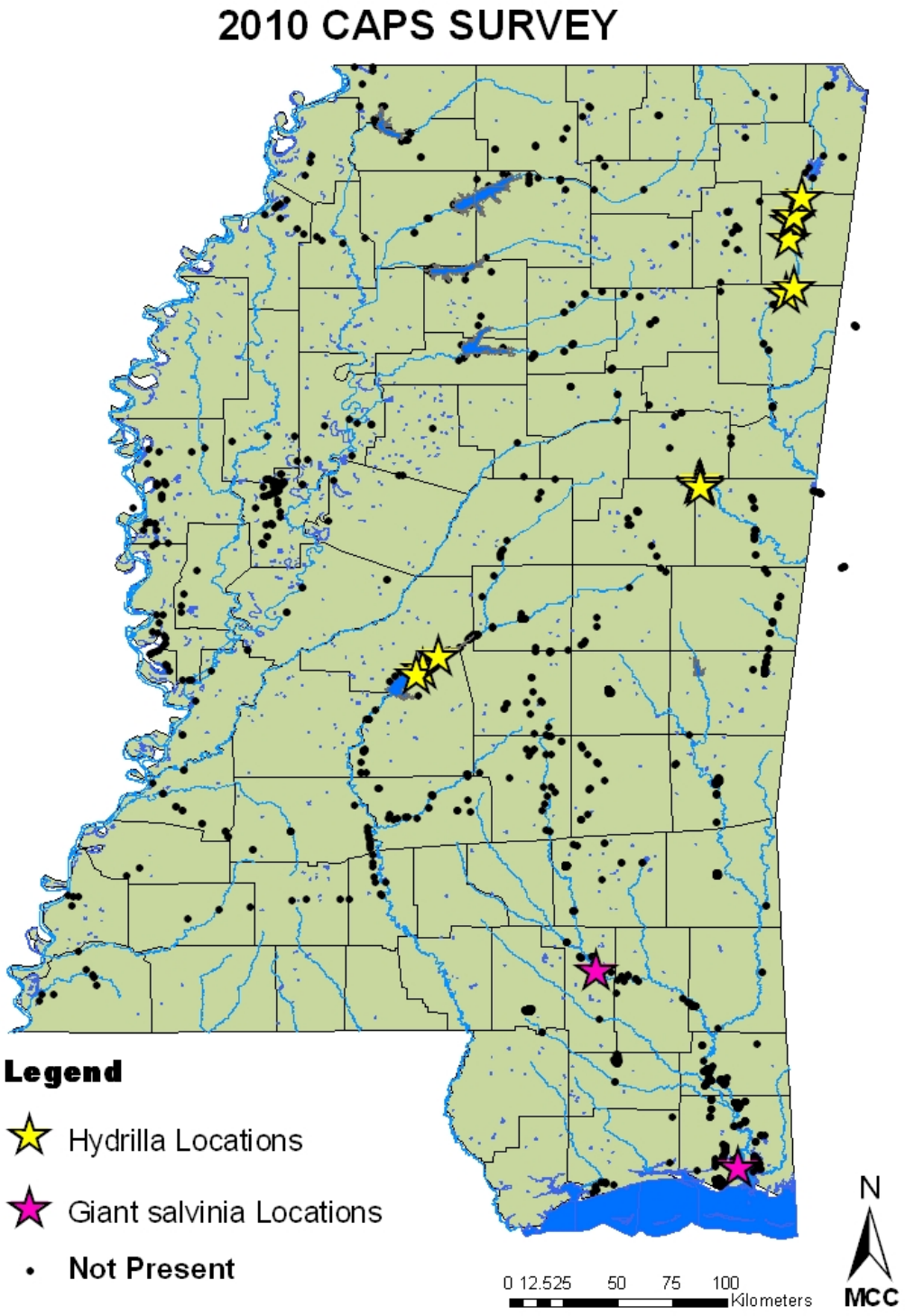

Figure 1. Locations of hydrilla and giant salvinia distribution in Mississippi. Included are points surveyed from 2005 to 2010.

Table 1. Geographic coordinates of known hydrilla populations in Mississippi and Alabama.

Water body	Nearest Town	County	Coverage (Acres)	Latitude	Longitude
Tenn-Tom Waterway	Smithville	Monroe	unknown	34.064	-88.423
	Smithville	Itawamba		34.089	-88.391
	Fulton	Itawamba		34.287	-88.417
	Fulton	Itawamba		34.362	-88.407
	Fulton	Itawamba		34.378	-88.392
	Fulton	Itawamba		34.385	-88.396
	Fulton	Itawamba		34.460	-88.360
Bluff Lake	Brooksville	Noxubee	>10*	33.282	-88.780
	Brooksville	Noxubee		33.284	-88.780
	Brooksville	Noxubee		33.287	-88.782
	Brooksville	Noxubee		33.284	-88.782
	Brooksville	Noxubee		33.282	-88.782
	Brooksville	Noxubee		33.282	-88.784
	Brooksville	Noxubee		33.284	-88.784
	Brooksville	Noxubee		33.285	-88.784
	Brooksville	Noxubee		33.282	-88.787
	Brooksville	Noxubee		33.282	-88.788
	Brooksville	Noxubee		33.280	-88.788
Loakafoma Lake	Brooksville	Noxubee	<1	33.266	-88.784
Ross Barnett Reservoir	Brandon	Rankin	>250*	32.486	-89.958
	Brandon	Rankin		32.562	-89.866
	Brandon	Rankin		32.508	-89.930
* indicates total coverage of hydrilla over the entire lake					

Table 2. Geographic coordinates of known giant salvinia populations in Mississippi.

Water body	Nearest Town	County	Coverage (Acres)	Latitude	Longitude
Wedgeworth Creek	Petal	Forrest	>3*	31.160	-89.130
	Petal	Forrest		31.280	-89.220
	Petal	Forrest		31.279	-89.220
	Petal	Forrest		31.264	-89.216
Pascagoula River	Gautier	Jackson	unknown	30.445	-88.626
* indicates total coverage of giant salvinia over the entire lake					

Figure 2. A topped-out mat of hydrilla growing in the northern portion of Bluff Lake at the Noxubee National Wildlife Refuge during June 2010.

Figure 3. Hydrilla removed from Loakafoma Lake in the Noxubee National Wildlife Refuge, September 2010.

Figure 4. Giant salvinia growing along the shoreline in Wedgeworth Creek, Forrest County, MS during September 2010.

Figure 5. A portion of Wedgeworth Creek just south of the Sims Road bridge completely enclosed with giant salvinia during September 2010.

Figure 6. Giant salvinia population in Wedgeworth Creek, Forrest County, MS during May 2007 (Robles et al. 2008).

Figure 7. Giant salvinia population in Wedgeworth Creek, Forrest County, MS during August 2008 (Robles et al. 2009).

Figure 8. Giant salvinia population in Wedgeworth Creek, Forrest County, MS during August 2009 (Cox et al. 2010).

Figure 9. Giant salvinia population in Wedgeworth Creek, Forrest County, MS during September 2010.